The India Review

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1843

ingly stood with Lord Nugent. They were, however, after an honourable struggle, successfully opposed by Messrs. Mildway and Hope.

In the very month following his defeat (Oct. 1842), Mr. Thompson again stood forth the zealous champion of the Anti-corn-law Association, and at the great meeting of the League, at Manchester, delivered a speech, the whole of which we would lay before our readers but that its length would absorb our entire space. As, however, it places the subject in a new and striking light, and shows Mr. Thompson's adherence to the principles he so early laid down for the government of his public efforts, to test all measures according to their conformity with the highest principles, we make the following extracts. The opinion entertained of this speech by those who listened to it, may be estimated by the fact, that, on the following morning, the Council of the National Anti-Corn Law League unanimously resolved to print, for immediate circulation, an edition of 10,000 copies:—

"There is one point of view in which this cause may be regarded, which to me appears an important one; and as you have called upon me to address this meeting, I shall make a few remarks upon it. I mean the connexion between the present appalling distresses of the country, and the acts of the government—and between both of these and the morals of the people. It is one of the most inspiring and mysterious considerations in relation to the nature of man, that his morality, so mighty in itself, and so endless in its issues, should be exposed to mortification and injury, from every influence that reaches him in his passage through life. The passions of his parents and playmates affect it, long after he is removed from their locality and sight. The influence of antidiluvian biography—the remotest imaginings of fancy—the tales of the nursery—the weeds of the garden—the love and fears of far-off strangers—the dreams of his neighbours—the fall of a thunder-storm—or the song of a ballad hawker—are all elements in the causes that collaterally affect the morality of our nature. Over these however, and a thousand other coadjutant forces, the will of man should, and can exert a presiding potency, and an all-subordinating control. The power to do this constitutes part of our moral obligation; the omission to exercise this power—a power of which we are all conscious—which we all confess to ourselves—(though we too often plead the force of circumstances)—the omission to exercise this power, I say, is "the head and front of our offending." Much of the world's morality is, however, the creature rather of constitution, interest, or habit, than of reflection and choice. But what then? Why this most certainly: the more spurious, imperfect and contingent, the floating every-day morals of the world are, the more grave, the more necessary, the more incumbent is the duty of wisely and jealously warding off the obliquitous influences by which men are known to be governed to so great an extent, and to secure if possible that the causes which habitually affect our morality should be as sound as they are permanent. Perhaps there is nothing that can be named, next to the power of domestic life, that operates on our morals with such uniform emphasis as *the laws under which we live*. They are made to produce certain effects—they are armed with high sanctions—they are backed by an all but irresistible power—they are enforced by pains and penalties—they are a present, and constantly operating motive—either restraining or inciting. Let me illustrate this by a reference to circumstances around us. *Poverty* is, it is well known, when excessive, is in most instances the mother of crime. If, therefore, the laws of a country doom the greater part of its people to a state of poverty, they become permanent "ministers of sin;"—and, as far as they have this tendency, they are chargeable with the guilt of immorality. What an appalling mass, then, of antagonist power are the governments of the world? The anathemas uttered in Paradise contained no elements inimical to the moral interests of the banished parents of our race. None. But, alas, the influence of most bodies of human laws is ultimately ruinous to the character of the people for whose government they were framed. An immoral law is seminal revolution; and, like all other seminal powers, requires only that time and circumstances should elaborate the mighty mischief. Hence the decline of former

empires. "Assyria, Greece, Rome, Carthage, where are they ?" And the same cause will precipitate, if not counteracted, our own fall. Immoral laws generally begin their history by creating false wealth, and false standards of excellence and power—which again become the seeds of other evils, and work the ruin of the state.

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"What can be a finer theme for any man, placed in society in this world, and especially in this part of it, than the morality of governments ? The theory of law is but an elaboration of the principles of justice, applied to society. But the practice of law is, for the most part, tyranny and fraud, supported by the wealth of the factions, and the ignorance and imbecility of the people. Whence came wars and rumours of wars, but from an invasion, somewhere, of the rights of political justice. Whence the wide-spread cruelties and oppression of India—the horrors of the slave trade—the wicked assaults on China—the perfidious aggression at Cabcol—but from the same cause. If one nation, and that Great Britain, could be brought to feel the importance of making morality and politics synonymous, what would be the influence throughout the world ? Then, indeed, our missionaries would not be thought satirists of their own nation ; our statutes and the Bible would be but different parts of the same body of truth. Our literature would be purged of much of its pollution and falsehood, and the halls of justice, that are now too often clotted with tales and proofs of might overcoming truth, would be redolent of another spirit, and to them the persecuted and the poor would turn, with an eagernes similar to that with which the homicide sought the safety bench in the cities of refuge of old. No one, my friends, doubts the importance of the principles and examples of an individual. The nation's principles and examples, which are but the condensation of those of twenty-seven millions of souls, are surely of importance in the ratio of the population, and our influence over other kingdoms. My friends, this is a thought which I cannot enlarge upon ; but it is worthy your most profound attention. I may illustrate it, by the case of the *abolition of slavery.* An act of simple justice, as between man and man. Yet, adulterated as it was, by the machinations of our opponents —think of the character we claim—the glory we have won—the influence we exert—the prospects we have opened—the destinies we have made certain—the blessings we have bequeathed—the peace we have secured—by this single, simple act, of common honesty towards a poor and oppressed race.

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"Assuming as I do, for the sake of argument—and deeming it unnecessary in your presence to prove—that the distresses of our country spring not from natural but from artificial causes—not from the chastening hand of God, but the death-dealing laws of man—not from the absence of the opportunities to trade, but, from the unjust and wicked prohibitions upon mutual interchange—and not at present going further into the workings of the national distress, I ask,—see you not the close connection between the acts of the government and the religion and morality of the people ? See you not that that which deranges the springs of industry and, annihilates the profits of trade, saps the piety of the people—palsies the hands of the teachers of religion—renders comparatively abortive the labours of good men—strikes off the blossoms which their culture had made to appear—and curses with moral sterility the region which otherwise might have been a fruitful garden ? The commercial blight which falls upon religious assemblies soon reaches the family and the school. The fire-side, once the seat of nightly hymn and prayer, where aspiring youth recounted the triumphs of the school, or rehearsed the favourite poem, becomes still and gloomy. The domestic comforts are reduced every week ; the apparel of the family is worn, shabby, and patched ; the wife, ignorant of her husband's difficulties, attributes her deficient allowances to his sinister habits of abated industry : the children join the clamours and complaints of the mother ; and the husband, wrung to the soul by underserved reproaches, perhaps commences an attendance at the tavern, which quickens the distress an hundred fold. At length the supplies altogether fail ; the want of trade forces the pledge or sale of every thing that will produce money ; and thus, the once comfortable abode of the respected mechanic is stripped to the bare walls, and the prospect is even worse than the past. Is this a mere fancy ? Let those in our large towns, or in this city, who are dubious of these averments, turn into the next street, and visit kindly the abodes of our once independent population, and judge for themselves. The physiognomy of the parents will be enough. They have not blazoned their destitution, *but they have no bed.* They have kept their children from plying the doors of their neighbours with tales of distress ;

but they have cried themselves to sleep. The parents chide each other for fools that they ever married, or were not more penurious in their prosperity. Their heart has relinquished hope—and taken to moods of alternate desperation and despondency : love is no longer in existence. The family is a mere juxtaposition of wretched creatures whose mutual sympathies have been destroyed by an involuntary self-ruin. Self-respect is given up : blasphemy against the GOD of heaven is heard, where the inmates are *desolate and hungry*. Maledictions fall heavy on the heads of governors—reverence for the laws is extinguished—plans of nightly theft are at length plotted without compunction ; and the heart of the once independent and contented mechanic swells now big with the turboil resolves of suicide ; and now with vows of ruthless abandonment to supposed fate. I boldly say, that the cases of deterioration and ruin of this kind, so lamentably frequent in our country, during some years past, lie at the doors of our rulers and legislators. On them fall the accumulated maledictions of these beggared wretches, with each setting sun and morning light. They know the remedy as well as we. The history of such men is not yet written ; and I neither envy its contents nor desire to share their responsibility.

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"Besides, the retention of a bad law operates mischievously in other directions. The sense of right and wrong grows strong by gratification and use. Popular indignation calls to its aid intrigue and cabal when it is manifest that reason and justice have no force ; and the defenders of wicked laws give a mighty impulse to sophistry and mammon to uphold what reason condemns and facts disprove. The retention of bad laws becomes a precedent to successive parliaments, and to other governments ; for, as far as the history of our base provision laws is known, it will be shown, that the nation that has covered the earth with its missionaries and its arts has yet the wickedness to starve its own poor, and the impolicy to ruin its own commerce, to retain the phantasmal dignity of an aristocratic faction. The authority of the English government is doubtless great, and will hereafter become the theme of frequent quotation, but, wherever its laws shall be imitated, Great Britain will be answerable for having done her best to propagate the monstrous falsehoods of the corn laws. Again, sir, a season like the present never comes without thoughts and theories of a revolution. Quiet and industrious men in multitudes catch the fervor of innovation: plans of indiscriminate vengeance are concocted : the press takes fire, and while one portion of it panders aliment to olden prejudices, another ministers to the new passions of constitution-makers and demagogues, to whom mischief is a mine of wealth and peaceable commerce a plague, and who ascend into the captaincies of the operative classes : youth unable to read are taught to pout at the wisdom of ages ; and men of battered fortunes, and still more battered reputations, find a market for their services, at least among the ignorant and profane —unhappily yet the majority of every nation. Informers become common, if not necessary, and by their vile arts inveigle the weak into ruinous and often fatal positions, and thus sedition's prelude proceeds. The contrivance of obnoxious laws swells the cause and proofs of discontent, and after a few outbreaks of the people, "massacre" is the word, and the organised force of the government triumphs over the disorderly power of the multitude, and the heartless upholders of insane laws quote their victories in support of the very abuses that originated the infraction of the law.

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"The morality of the law should be its strength, and it is so, when their justice is "judged of all." Were governments just—states would be eternal. But we are told that it is impossible, by the wisest system of legislation, to prevent these periods of commercial distress—these visitations of famine—these recurring seasons of blight and mildew upon the fair prospects and blossoming hopes of a nation—these wholesale prostrations of a nation's morality, and general stagnation of its most sublime and elevating agencies. We are told that they are collapses as natural and necessary to the healthy progress of industry, as periods of rest and sleep to the animal system : and some will tell you that by studious and profound calculations they have penetrated the mystery hidden from vulgar eyes, and can prove by figures that the most precious portion of a community like ours should partially submit to famine as a punishment for being too industrious—and too ingenious—and too enterprising. (Hear, hear.) That it is not the corn laws, or other restrictions upon trade, that have entailed and worked these evils, but the genius of Watt, and Bolton, and Arkwright, and

the avarice of men who have given employment to milions at home, that they might clothe the bodies of milions abroad These astute arithmeticians —these patient plodding calculators of a world's wants, and a people's destiny—who count spindles, and measure the power of steam—and reckon the noses of the population—and who greatly love the corn laws—not because they happen to possess the land, and realize a few extra thousands by their existence, ten per cent on which they are willing to give to the poor, if you will only let them keep the other ninety—who love these laws simply because of their wisdom and beneficence, and because Sir James Graham loves them, who once demonstrated that they were the most unlovely things that ever defaced the statute book of any country—these new lights who shed their radiance over dark intellects, will tell you that the evils we deplore come of machinery and its too productive powers. They will tell you that the Creator has invested the mind with powers destructive of itself. That the more the intellect expands, and the nearer it approaches to perfection, the condition of the bulk of nations must of necessity become worse. This is the pith and marrow of the famous argument of "*over production.*" The calculations of our modern Casios, who consume the midnight oil, when hungry children have wept themselves to sleep, bring them to the conclusion, that these distresses are the consequences of the triumph of mind over matter—the curses which genius has inflicted on a nation, which was happy in the days of the distaff, and knew no sorrow till the mule and the spinning-jenny were invented. And to prove their prophecies, and uphold their theory, they sustain laws which shut us out of the markets of the world, and when they have deprived machinery of fair play, turn round and say—"Behold the ruin it has wrought!"

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Mr. Thompson's visit to India, forms the latest, though we sincerely trust that it will not prove the last important event in his active and useful life. His motives in undertaking so long a journey, have been explained by himself in speeches delivered at various farewell meetings in England and Scotland, as well as in addresses delivered to the native community since his arrival in this country. From the latter we make several extracts, in order that our readers may be fully informed in reference to the objects which Mr. Thompson has in view. A week after his landing, Mr. Thompson was invited to attend a monthly meeting of a society composed of Hindoo gentlemen, established for promoting the acquisition of General Knowledge. At this meeting, Mr. Thompson, at the request of the chairman, delivered an address, and at once unfolded the object of his visit to these shores. He said :—

"I have long felt a deep and constantly growing interest in the condition, the prospects and the destinies of the people of India. I have read of India, and I have dreamed of India. I have written respecting India, and I have spoken in behalf of India. But dreaming, or talking, or writing, I have always had one wish present to my mind, that I might see the country for myself, might mingle with its people as I do now, and through the knowledge acquired by travelling and observation, be able to be of some service to the cause of my fellow-subjects here. At length I am permitted, through the kindness of Divine Providence, to stand upon your soil, and this evening I find myself in the midst of some of the most educated and enlightened of the natives of the country. So great do I esteem this privilege to be, that I can hardly believe that I am not even now enjoying a delightful dream rather than gazing upon a real scene. Allow me to say it is no feeling of mere curiosity that has prompted my visit to your shores; still less a desire to advance my personal and worldly interests. My duties and engagements at home were of too important a nature to suffer me to abandon them, even for a short time, from any consideration less than a conviction that my future usefulness might be promoted by a knowledge of the actual state of things around you. I come not therefore, to gaze upon the splendour of your rivers, the sublimity of your mountain scenery, or the grandeur of your scattered monuments of former greatness. All these are objects of interest, and as they come in my way, I shall contemplate them with no ordinary regard. I come, however, to study the living population, and all other subjects, only in connection with the present

and future well being of those who were created to possess and enjoy the riches and the splendour of this glorious region."

He thus concludes the same address:—

"The object which brings me to this country is nearly allied to your own, in fact it is one and the same,—the acquisition of knowledge. I have heard of you and of your country by the hearing of the ear, and I think I know something of your condition, peculiarities and wants, from the study of the best informed writers; but this was not enough for one who sought to give an accurate representation of the real state of things. I have therefore come hither to see and judge for myself, and as long as I remain, shall esteem it a duty and a privilege to cultivate the acquaintance of the native population that I may understand their feelings and their views. The only reward I seek for any efforts in your cause, is to see you qualifying yourselves to be hereafter the enlightened vindicators of the claims of your countrymen to the sympathy and support of all the lovers of moral and political justice in England."

At another meeting of native gentlemen, he thus frankly avows his feelings towards the native community, and his views of the general conduct and duties of his countrymen.

"He trusted he was entirely destitute of that prejudice which led too many of his countrymen to regard the natives of the countries they had colonized, or conquered, with disdain. He (Mr. T.) had no such feeling. With the religious views which he held, he should consider that he committed an offence against the Being who was the maker of all men, if he allowed country or complexion to make any difference in the treatment he pursued towards his fellow creatures. He respected men according to their virtue and intelligence, and judged them according to the circumstances in which they had been placed. If men were ignorant or degraded, through the disadvantages of their birth, and their want of education, they were not therefore to be despised, but to be commiserated and befriended. Weakness had a sacred claim upon strength. Neither nations nor individual were justified in taking advantage of the ignorance or helplessness of others. He frankly avowed his conviction, that his countrymen had too often forgotten their duty, and had been more anxious to extend their territory and increase their wealth than to promote the happiness and elevation of those whom they made subject to their sway. The time was coming he trusted, when the duties which England owed to her dependencies would be better understood and better performed."

Again, in the same speech he says:—

"Without in the least degree wishing to bring discredit upon the *intentions* of the rulers of India, he had long thought it essential to the interests of the people of India, that their fellow subjects in England should cherish a more lively concern for their welfare. But this could not be effected, as long as a profound ignorance brooded over the affairs of India. It was to dispel this ignorance, that he resolved some years ago to exert his voice and his pen. He believed he had not laboured in vain. Still he had found it both difficult to obtain information, and difficult to bring his countrymen to believe that which he had collected from the best available sources. To remove these impediments, as far as might be, he had undertaken a voyage to India to see and judge for himself. Through books he had become familiar with the past history of the country. He had read the works of those who had described the country while under governments exclusively Hindoo. He had read various accounts of the Mahomedan conquests, and their effects. He was familiar with the history of his own countrymen in these shores, and the characters and acts of the many celebrated men who had ruled here in various departments. He had studied the mechanism and operations of the British Indian Government, and had left no means untried of obtaining accurate information of the real condition of the people under British rule. But though he would venture to say that his statements, as respected principles and general measures, could not be successfully controverted, yet at the same time, he had always felt the necessity in his peculiar circumstances, of possessing a personal acquaintance with the country. But there was another object he desired to accomplish by his visit to India. It was, to rouse the intelligent natives themselves, to a sense of the necessity of becoming the narrators of their own

grievances, as far as they suffered under any, that were removable by legislation. He had no wish to inflame the minds of the multitude, or to spread a spirit of disaffection through their ranks. He should sincerely deplore the dissolution, (were it practicable) of the present connection between this country and Grea Britain: for this reason, chiefly, that he thought the people of England were just awakening to a sense of their duty, and would hereafter, if wise measures were adopted, be induced to manifest such an interest in Indian affairs, as would lead to the most wide and beneficial results."

Mr. Thompson disclaims all desire of concealment, or secret organization, in the carrying out of his plans. He is thus explicit on this point:—

"He did not wish these meetings to be considered *secret*. He had not in his heart a single wish or thought respecting India, which he was not prepared to avow in the most public manner. All that he had to say to his native friends, he was willing to say, if it were convenient, in the presence of his countrymen and the Government of the country. All his plans were in perfect unison with the maintenance and perpetuity of the British sway, because they were founded in justice and impartiality—principles, he conceived, most likely to attach the people to their rulers. He had no means to purpose which were not pure, and peaceful, and constitutional. He could embark in no movement dictated by a spirit of faction, or promoted by improper agencies. Whatever objects he sought to gain (and they were all of a loyal and peaceable character) he sought to gain by the spread of knowledge, by moral power; in a word, through the influence of the intelligence and virtue of the people."

In another of his weekly addresses, Mr. Thompson gives the following advice to his friends, and with this extract we shall conclude:—

"You should, besides, become familiar with the principles of your own Government, you should know the nature and character of the progressive changes which it has undergone, and the means by which those changes have been brought about. By such a process, you will understand how future changes may be effected, and how the acts of the Government may be modified or controlled. Let me say, also, that in your peculiar situation, you should study the history of England, and obtain a knowledge of the constitution and form of Government, as well as of the genius and spirit of the British people. I need not tell you that England is the fountain head from which your benefits must flow. The Charter under which you are governed is made in England. The men who rule you, through the power that Charter gives them, come from England. The monarch of these realms has her throne in England. The source of patronage is in England. The Board of Control is in England. The East India Company's Directors are in England. And, besides all these, and let me say above all these, and more powerful far than all these put together, there is an enlightened people, who with all their faults (and I would be the last man to praise my country beyond its deserts) have a strong sense of justice, a quick perception of what is right, a generous feeling for the helpless and oppressed, and an energy of character which when displayed in a righteous cause, has always triumphed over every difficulty. Such are the people of England, their enemies themselves being judges. This country and this people you should know. I fear no dissolution of any subsisting ties, from the cultivation of the most intimate knowledge of the people of Great Britian. Judge not of our country by the acts of a few. Judge us rather by those deeds of universal charity, which have gained us unsullied fame even at the ends of the earth. Our national power has been abused—our honour too often tarnished—our resources too often prostituted—and our religion too often disgraced—but the heart of England has not been turned from the love of justice, nor her arm paralized in the cause of the poor."

We have thus made Mr. Thompson the author of one of the most interesting portions of his own history,—the history of his mind—its workings, its principles, and its views, upon those great questions in which he has taken so conspicuous a share. This, as a public man, and

a REFORMER (in the truest and best sense of the word) is *the* portion of his history in which mankind feel the deepest interest; and it is the peculiar characteristic of Mr. Thompson's public addresses, that he leaves no room for conjecture respecting the motives which animate him, or the objects at which he aims, or the measures by which he proposes to reach the goal of his desires. Openness, manliness, and transparency, are always conspicuous; and these will command respect and confidence from honest opponents, as well as from admiring friends. Mr. Thompson carries his heart in his hand, saying to all,—"Search me, and prove me, and know my ways." We believe that these moral qualities, rather than the possession of the gift of eloquence, have obtained for Mr. Thompson the position which he fills in the estimation of his countrymen, and not of them alone, but in the estimation of those in every land who desire to see the [illegible], when in the emphatic words of Mr. Thompson, "*morality* and *politics* shall be synonymous."

Having briefly traced the public career of Mr. Thompson through the past, it remains but to say a few words in connection with his labours at the present time. He has now chosen for his field, a wide and noble sphere, and one in which, unhappily, the labourers are too few. Should his life be spared, we trust he will be individually of great service to the country whose cause he has espoused, and find many worthy and zealous co-adjutors in his benevolent and patriotic toils. As his sole object, while in India, is to collect information and extend his observations on the actual state of things, we trust that all who have the means of rendering him assistance will place their means at his disposal. In proportion to the knowledge he obtains, will be his ability to serve the cause of India, when he shall hereafter (as we trust he will) stand forward to enlighten our countrymen at home, and to enlist their sympathies and energies in the benign work of ameliorating the condition of a hundred millions of human beings. As Mr. Thompson emphatically disclaims all mercenary and factious motives, he is entitled to the confidence and assistance of men of all parties; and as his desire is to form just opinions, every opportunity should be afforded him, of seeing the workings of that great system by which this country is governed. We believe Mr. Thompson finds no reason to complain of the disposition of those who are at present exercising authority at this presidency. It must have been to him a source of sincere satisfaction, to find himself anticipated on one question of great interest and importance—that of slavery. We hope he may remain long enough to see the proposed acts on that subject adopted and carried out, and, also, to see other great measures of improvement commenced. So that, when he shall return to his native land, he may have a bright side as well as a dark one to present before his countrymen; and, while he finds it his duty to point to many evils, and many defects, be at the same time able to point to many salutary reforms, and to herald the dawning of a better era upon these regions. May the God who has been his guide and protector hitherto, and thrown over him his shield in the hour of peril, and made him the honoured instrument of achieving much in the cause of suffering humanity, still be his conductor and defence, and make him yet more abundantly honoured and useful! And, when at last he

ceases to labour and to live, may the INDIAN and the NEGRO hold in equal and grateful affection, the memory of the labours and triumphs of GEORGE THOMPSON!

In person Mr. Thompson is tall, of a full and manly, though not robust form: the features handsome, and, when discoursing on any subject of interest, express with peculiar animation and force the various emotions of his mind. The Portrait, we doubt not, will be recognised as faithful. The position and expression are both characterestic:—the latter presents, we think, more of what is commonly termed "life" than most of Mr. Grant's sketches usually exhibit.

ORIGINAL COMMUNICATIONS.

THE EFFECT OF THE LATE WARS IN AFFGHANISTAN AND IN CHINA. THE PRESENT STATE OF BRITISH INDIA.

By Major W. Hough.

1.—In taking a Review of the late Wars in Affghanistan and in China, as well as of the present state of British India, I shall consider the subjects in a *national* point of view, divested of all *party* bias. No public Journalist can fully know the reasons of Government for any particular line of policy, till time shall make public that which, to be well executed, must, for a season, be in the *secret bureau* of the Governor General and Council. There is not, in India, properly speaking, a PUBLIC, because the European Society is chiefly composed of the members of the services, if we except the cities of Calcutta, Madras and Bombay;—therefore, it would be unreasonable to expect that the measures of Government, which in England, as regards war or foreign policy, are kept secret for a time, should, in India, be developed by the Governor General to the Public, and thus satisfy their curiosity, at the expense, possibly, of national defeat! Even the very Editors who desire, by such early communications of the views of Government, to satisfy the appetites of their subscribers for news, would, themselves, in case of any miscarriage of affairs, be the very first persons to condemn the measure! And, while in the absence of correct information as to passing events, rumours are showered forth in abundance, without any counter opinions—or, while their correspondents detail events as they hear reports, or see part of events enacted, and retail them to the public, the Editors of Newspapers are apt to favor views of their own, instead of recurring to the principles which are connected with our national policy—not reflecting that it is "*measures and not men*," which should govern our conduct in British India. Some are for the "*non-interference system*"—others desire to interfere with *all* the Native states. The policy of the Marquis of Wellesley on the

capture of Seringapatam, in 1799, and the possession of *Mysore*, in not retaining in our hands the *whole* of that conquest, has been condemned, even in the present day—without recollecting that, while we were in justice bound to reward the Nizam with a share—had the British Government kept the whole country, it would have been considered as a desire to destroy or humble all Mahomedan states!—Besides the injustice of not restoring the Rajah of Mysore to part of his country! Thus by the partition treaty we satisfied the Nizam, a Musselman power, we, also, at the same time, raised up a Hindu state; so that we rewarded the one, and did justice to the other: evincing, at the same time, *moderation* in the hour of victory. *Clive* said, after the battle of Plassey "we must advance, it is impossible to remain stationary!" To what limit were we to advance? The Mahomedan writers say the *Indus* is the natural boundary of Hindostan. We say so too—we are now to hold our frontier on its banks,—we shall command its waters; our commerce will be sent up and down its stream into the Punjab, and down to the sea, and the commerce of Great Britain, and of all India will interchange commodities: wealth will flow into both countries; and thus may the conquest of India, by Great Britain, prove a blessing; we must sheath the sword of victory, and introduce the arts of peace. We must make roads, dig canals, and improve the country!

2. If we regard British India as it stood before and in 1838, we shall not in 1843 see cause to fear for the future. The two wars of Affghanistan and of China, are to be viewed in conjunction. The former began in 1838 and was ended in 1842. The latter commenced in 1840 and was finished in 1842. The Friend of India (12th January, 1842) says, "Of the amount of debt actually incurred by our campaigns beyond the Indus we are not able to give any accurate statement, but we think *five* millions sterling will be found rather above than below the mark." We estimate the cost at more. By the *Parliamentary Papers* we find the sum to be:—

To the 30th April, 1840	Co's. Rs.	248,50,062
Or say about		£.2,330,000
Take to end of 1842—same rate of charge		4,271,700
		£.6,601,700
Or say		£.7,000,000

If this estimate be correct, the question is whether we are likely to gain any future benefits from such an outlay. Without regarding the question of *right*, but looking at the question as one of *Policy*,—which has been our rule of conduct since the time of *Clive*,—have we gained no advantage by obtaining a knowledge of the country invaded, of the impracticability of an invasion of India by any power, so long as we hold the Government? Did not the commerce between India and Cabool increase three fold before the expiration of 2 years after our arrival at Cabool, and is it not probable that, now we have left the country, it will increase? The Affghans have no enmity to the

people of India, and it is with them they trade. Native merchants from Delhi and other places send their goods, some direct by the Punjab, others viâ Bhawulpoor. Even at this time, while our troops were retiring from the country, Affghan merchants have come to Howrah, near Calcutta, with Camels to be laden with our produce! The selfish character of the Affghans will cause them to forget the past and to look forward to the future! Who were greater enemies of Great Britain than the French, and with what nation, now, are we on better terms, and with whom have we more extensive commercial relations? As with European, so with Asiatic nations, the intercourse with each other is for mutual advantage. If the policy to create a barrier against invasion has failed in our hands, it may, on Dost Mahomed's return to power, be realized, by the securing to him Candahar as well as Cabool, for this return will be with increased power, as he now knows the strength of parties in his country; and they will view him as the Ruler most likely to preserve Affghanistan from an invasion from Herat. The expedition to China would be condemned by the same parties who disapprove of the other war. But, whether our previous conduct regarding the Opium was proper or not, the Chinese insulted our superintendent, and imprisoned him, and compelled the delivering up of the Opium. We are victorious, and the millions of dollars paid will amply repay the expenses of that War. The result of the 4 years War in Affghanistan, will be, say, a cost of £7,000,000, without looking at the wars as those of a *Whig* or *Tory* Government—for we maintain the policy of India to be *national*. What did the War in Ava (1824 to 1826) cost in 2 years?—£12,000,000! The gain by that War is not equal to the interest of the debt! Our former Wars were attended with territorial advantages and acquisitions,—looking at the period of from 1799 to 1804-5, and the Mahrattah War of 1817-18. The Goorkha War of 1814-16 was attended with territorial acquisition, but of little value; it, however, improved our frontier, and curbed the Nepalese. The War in Ava, cost a vast sum, yields but little at present, though its future advantages may be much greater with regard to commerce. It also improved our frontier. The expedition to the *Mauritius* (1810) was one of imperative necessity, but is a yearly cost to the Government of England!

The Expedition to *Java* (1811) may be considered as so much money thrown away, as it was given up at the Peace. We kept our knowledge of the country, and of its resources—the Minister's *bureau* contained the Governor's reports of the resources of the Island, and were opened, too late, *not till after it had been given up!* Thus, we see, that the remark made by the Edinburgh Review, in 1818, that the wars in India were wars of acquisition, paying the expense of conquest, yielding a good revenue, does not apply to the years 1824-26, nor to 1838-42. If we regard the wars in Europe, we shall see no territorial acquisition of *pecuniary* value. Those wars were to preserve the balance of power in Europe, in self-defence, or to extend our commerce. Is it then reasonable, that in India we are to pay nothing for the security of our frontiers, or to extend our commerce? The merchants in England were loud in exclaiming against the apathy of ministers in not raising means to extend our

commerce in Central Asia. On the first step taken to lead it into Central Asia, loud are the voices of the people (not merchants) in condemnation of the expedition—but, chiefly because it failed in one of its objects. Time will show if it proves advantageous to commerce.

3.—The war in China is one of the best political measures since the battle of Waterloo and its consequent results. The possession of the Island of Hong-Kong, the opening of the 5 Ports of Canton, Amoy, Foo-choo-foo, Ningpo, and Shanghai*, to British commerce and enterprise, and the payment of 28 millions of dollars, by which the war expenses are paid, and probably a portion may be available towards the expenses of the war in Affghanistan,—are advantages which few could have expected in the commencement of 1840; when our Trade with China was that of the smuggler, instead of being now licensed by a treaty signed by the Imperial *vermillion* pen! From the Port of Canton to Pekin, commerce will be uninterrupted—the 4 ports on the eastern-coast will extend commerce from east to west through the whole Empire, while we hold Hong-Kong as a permanent depôt for *all* the purposes of commerce or any other object, as we shall maintain a force on the Island, which will afford a harbour for our ships. The Consuls at the several Ports will have the opportunity of gaining a knowledge of the country, and of the people, which must be the means of introducing European civilization. Though the war be condemned by a certain class, all must admit that the results must be of great benefit to the *people*. The result of the war has proved, that the Emperor is accessible—that the Mandarines have been punished for concealing the state of affairs from the "*Imperial Ear*," that the Emperor is disposed, out of parental concern for the good of the people, to look into affairs, and that the abuses which they have been subject to—the frauds of officials—the tyranny of ages, will be abolished! The *people*, indeed, every where received us well, and were ready to supply all our wants. It was the Chinese aristocracy who crippled the trade of China, and paid into the Treasury what they chose, and no more. It would have been unwise to have asked for an ambassador at the Court of *Pekin*—other nations would have made the same demand. We want no political relations with the Chinese—none but those of a commercial nature—the consuls at the ports will be quite sufficient; other nations may trade to those ports, with the permission of the Chinese, and at Hong-Kong our leave will be sufficient. That the Chinese will gain by the war is most clear. They are already procuring steamers, and they will naturally build ships after European models, and thus will be better able to extend their voyages. We may expect them to visit not only Calcutta, Madras and Bombay, but, in time, will visit England; such a great change must in a few years cause them to adopt the European style of living in many respects, and to make those improvements in their houses, &c., which the natives of India have adopted. Though it may take many years to effect all the benefits to be reasonably expected to ensue, the result is certain. People have argued against the belief of such changes in a peculiar people (whose population is about one third of that of the world,) from the experience of 200 years.

* At Chusan the East India Company had a Factory in 1672—taken from us by the Chinese in 1710!

While our knowledge of the Chinese was confined to an intercourse with the people of Canton and of Macao, how could we *know* the people of the country! Does a knowledge of the inhabitants of Calcutta, Madras, or Bombay, convey a just knowledge of the native character of India,—surely not. What have the last few years effected in India! Natives of India of rank have visited England, and our sepoys and other natives are ready to embark on any expedition, and even *Native Coolies* go willingly to the Mauritius to gain a superior livelihood; this is the spirit of enterprise, the overcoming of prejudices. The *opium* question some think should have been an article in the treaty; I think not. If the Chinese Government find they cannot prevent its finding its way into China, they will most likely legalize the trade in that drug. To levy a high duty will lead to smuggling, a moderate duty will enrich the Treasury, and as there will be proper Chinese mandarines at each port, and effective measures taken to have correct returns, the Chinese Tariff will work well; and the Emperor will, *now*, know what he ought to receive—so that even the Treasury will, in the end, gain by the war, so much condemned by those who do not repudiate levying taxes on *Gin-palaces* or on any article in *England*!

4.—The "*non-interference system*" is advocated by one party, but it is an erroneous opinion to suppose that the eastern, or any other nations, in their present state, can either be beneficial to themselves, or to the rest of the world. The introduction of *European* civilization will open those channels of commerce and social intercourse which must be of advantage to both parties! If it be contended that by imparting knowledge we give them the power to become independent, it is admitted. But as civilization is a benefit conferred on mankind, our interference is justified, if it be not abused. It is obvious that the uncivilized nations must for ever remain in ignorance, unless those nations which are civilized make the effort to improve them! We came to India as adventurers, obtained a factory, and subsequent events and self-defence compelled us to conquest till we have become possessed of British India. Rajahs and Chiefs have been dispossessed, but the *people* of the country have benefitted by our rule! The expedition into *Affghanistan* was undertaken under the belief that Shah Shoojah was desired by the people. The object was to form that country into a barrier against any invasion of India, by consolidating the divided country held by the chiefs at Cabool and Kandahar, &c., into a kingdom. The principle was a legitimate one, but no conquest, for ourselves, was contemplated, it is not worth the cost, nor would it have been a wise or just measure. In self-defence, the creation of such a barrier against invasion, was calculated, under our guarantee, to be beneficial to Affghanistan itself, as a defence against aggression from Persia, or from the Punjab. From our predominant power in India, not only our own safety required some effective measure, but, as the principal power in Hindustan, we owe it to all the independent native states to protect them from external invasion! While it is a political object to defend the minor states, every measure which extends the commerce of *British* India, must be beneficial to *all* India! We desire to obtain from *Sindh*, the cession of the sea-port of Kurachee, which commands the entrance from the sea, into the river Indus. Also to

obtain Tatta (where we had a Factory in 1751, subsequently given up), and Sukkur on the right bank, and Roree on the left bank of the river, as well as of the little Island of Bukkur, separated from Sukkur by a small channel of the river. The above places will command the navigation of the Indus, and insure the transit of commerce. But, in case of need, should more British regiments be required from England, a few months after the requisition, troops could be sent by steamers, and could be landed in Sindh; so that in every point of view, our possession of the above stations will be of great advantage, and will ultimately enrich the Sindh country.

5.—The assembly of the "*Army of Reserve*" has been a subject of doubt as to the cause, or causes, which induced the Governor General to direct its formation. When Major General Pollock, on the 4th January, 1842, marched from the right bank of the Sutleij, through the Punjab, it must be recollected that Brigadier Wild had been previously detached towards Peshawar, with the object of relieving Major General Sir R. Sale's force from its critical situation at Jellalabad. Owing to the insurrection at Cabool on the 2nd November, 1841, the retreat of the force from that capital was daily expected. The fate of that force was not known, but the worst results were expected. It was a possible contingency, that both the Cabool force, and Sale's might be cut off; had that been the case, Genl. Pollock's force would have been the only British force beyond the Sutleij. Whatever faith we might have in procuring aid from the ruler of the Punjab, he was newly placed in power—his people did not dislike us—but his army might *not* obey his orders—and had our advanced forces under Sale and Wild, met with any reverse, the Sikhs might have turned against us! With the power in our hands to prevent such an occurence, it would have been politically unwise to have left the fate of troops to the good faith of any power, for the keeping of that faith would depend on our apparent strength on the spot to command its faithful keeping! It is clear that Sher Sing has not a *sole* voice in the Punjab. His not giving the meeting to Lord Ellenborough could not be grounded in fear of personal safety, for, in 1831, Runjeet Sing came to meet Lord W. Bentick. Though the army of Reserve was not all assembled till a late period, the successes of Pollock and Nott at Cabool, in September 1842, rendered the measure unnecessary. Therefore, the above may be considered as one reason for its assembly. Another reason may be assigned. In case of any reverse to the force of General England retiring from Candahar on Sindh, it would have been necessary to move troops from Sindh to his support, and to replace them from the "Army of Reserve." A third reason will we seen in the general political effect to be produced in the minds of the native states in India, that, while we had a few months before met with reverses, while we had an army at Candahar, in Sindh, a force at Jellalabad, and at Peshawar, and an army in China—we could assemble a large army on the banks of the Sutleij, prepared for any contingent service; and if we look to Sindh, the "Army of Reserve" will, there, in a measure, decide the Ameers to sign the treaty offered to them! The expense of this army may be five or six lakhs of rupees a month; but suppose 20 lakhs to be the cost, it does not amount to one week's revenue!

6.—The effect of our reverses in Affghanistan has been cancelled by our recent victories in that country, but the history of India proves that during the last 60 years, we have had reverses, while we have *always* recovered from the blow when our means were not half of what we now possess. After the destruction of the forces under Colonels Baillie, and Braithwaite, and General Mathews (1780 to 1783), we find Lord Cornwallis, in 1792, reduces Tippoo Sultan to sign a peace at his capital, with the loss of half his dominions; and in 1799, under the administration of the Marquis of Wellesly, Seringapatam was taken, Tippoo killed, and his whole country is partitioned among the conquerors! While the Mahrattah war of 1803-4 closed with glory under the conquests of General Lake, Monson's detachment, in 1804, being unsupported was cut up. Holkar broke into our newly acquired provinces—then followed our victory at Deeg. The over confidence of Lord Lake, induced him to lay siege to Bhurtpoor in 1805, with only 10 guns and mortars, and with a reduced army. He failed, but he compelled the Rajah to pay 20 Lakhs of Rupees as the terms of peace. Our successes in the Nipal war (1814-16), in the Mahrattah war (1817-18), and in the Burmese war (1824-26), were not unclouded by partial reverses incidental to warfare. The wars in Nipal and the Burma country were of that peculiar nature, of operations in a mountainous country, and in the marshes and jungles of Ava, and unhealthy region of Arracan, that natural difficulties, as well as climate, were to be contended with;—the results, however, were successful. The wars in Nipal and Ava yielded not adequate returns for the cost; they were undertaken to redress our wrongs, and to protect our frontiers. After our reverses at Cabool, read the victories gained in China, the commercial advantages obtained by treaty—and the result of the operations of the forces of General's Nott and Pollock, by a simultaneous march on Cabool, from Candahar, and Jellalabad, the release of our prisoners and hostages; and the safe return of our troops to Ferozpoor, only a few months after; and then let us ask if British India is not more secure than it ever was! Before the army under Sir J. Keane reached Cabool, the Nuwab of Kurnaul, and other chiefs, were plotting the destruction of the British power. The state of Nipal was watching the event. The Burmese were waiting to make an attempt to recover their lost provinces.—The Rajah (an usurper) refused, though confirmed by a treaty, to receive our ambassador! The public mind, in India, was agitated by the course of events! The destruction of our forces beyond the Indus would have been the signal for a general insurrection, and refusal to pay the Revenue! The Government at home sent out troops from England,—troops are moved from distant quarters to our frontier, and all India saw, that it was under *reverses* that the *real strength* of British power was called forth; to prove to the whole world that nothing but a *Winter's snow* destroyed our force on its march from Cabool, and that nothing can withstand British discipline and bravery!

7.—The Native army has now had to contend against our enemies in every quarter. In Egypt, at the Mauritius, at Java, in Nipal, in Ava, in Affghanistan, and lastly in China, so that, both by land and by sea, they have been engaged against the French, the Dutch, and the most warlike of the Asiatic nations. They have broken through

their prejudices by embarking on board of ship,—braved the dangers of the sea, a new element to them,—borne patiently the discomforts of a voyage—at times deprived of their accustomed food—and have served in climates uncongenial to their constitutions! How different was the case in 1780, when a detachment of sepoys were sent to Madras to join Sir E. Coote, who had sailed with the European troops. It is stated by *Mill**, that "the prejudices of the sepoys rendered it hazardous to attempt to send them by sea." In 1801, Volunteer sepoy Battalions went to Egypt, and even since have volunteered in numbers greater than required for the service. They have encountered the enemy on the plain, and among mountains! The East India Committee of the Colonial Society in London, in their Report, dated 19th June, 1842, after condemning the war in Affghanistan, have asserted that among the effects produced by the war, has been, "The chilling the affections of the native army, and causing an indisposition to enlist." This article was published in the Bengal Hurkaru of the 17th and 18th of November, 1842. It is singular that none of the Editors of newspapers, have refuted the assertion! At the time the above report was made, General Pollock's force had reached Jullalabad which is in Affghanistan, and the subsequent conduct of the sepoys will prove, that they have not only sustained their usual character for gallantry, but were outrageous when it was supposed that the army was not to advance to Cabool, and particularly in General Nott's force the native troops were *eager, to a man*, to advance to Ghuznee to *release their comrades, then prisoners!* The good feeling too which existed between the native troops and the European soldiery, was never so conspicuous as during the defence of *Jullalabad* by its *illustrious Garrison*, Her Majesty's 13th Light Infantry, and 35th Native Infantry,—proved by a dinner given by the latter to the former Corps†. With regard to the indisposition of men to enlist into the Native Corps, it is to be remarked, that all the Corps have been kept complete. The number of Regiments of Bengal Native Infantry (74) is greater than at any former period of our history,—each Regiment consisting of upwards of 1,100 men. Of late years, a great number of the sepoys of Madras and Bombay armies are enlisted from the Bengal Presidency. The Nizam's army is recruited from Bengal, and there are many contingents and irregular Corps which have, of late years, been raised. Besides which the force for Shah Shoojah alone, contained 6,000 men. Two Volunteer Battalions went to China in 1840 and 1841, so that it is clear that the demand for sepoys, from the year 1838 to 1842, has been unprecedently great. The advantages obtained, of late years, by the sepoys are great, the extra pay, after 16 to 20 years service, has been a grateful boon—the order of *merit* and of "*British India*," and the grant of *medals* for the late services, must attach the native troops to the British Government. We regret that a former Regulation, allowing of their suits in the Native Courts of justice having a prior claim to all others has been abolished, but we know of no disinclination to enter the service in times of peace or of war!

* Mill's (Wilson's Edition) History of India, vol. 4, p. 127.

† The sepoys, besides giving the men of Her Majesty's 13th Light Infantry plenty to eat, gave them 60 *dozen of Beer*!

8.—The East India Committee, not content with asserting *one* effect of the war in Affghanistan, in a manner to alarm the minds of the British public, have ventured to cull, from unauthenticated and imperfect document's, a statement of our losses which proves, at once, that if they are *not* to be credited in one assertion, great doubt must be entertained on all the rest of their Report! The Report states that there has been a loss of 50,000 men. An officer, one of the prisoners, states—"12,000 camp followers (I should say) marched from Cabool, 8,000 perished by the sword and famine on the road, 1,000 probably escaped to India, and the rest found refuge in the country. Of 4,000 soldiers, who marched out of Cantonments, about 500 found their way back to Cabool, 500 deserted to the enemy*, and the rest with a few solitary exceptions, fell in the retreat†." This would not make the loss amount to more than 12,000. If we include the destruction of the Goorkha Corps of 800 at Chareekar, and our loss in the actions from 1839 to 1842, we could not raise the number to above 17,000 or 18,000 men, including camp-followers and of the soldiers, alone, to not above 5,000 in 4 years! So that the Report is erroneous by nearly *two-thirds* or 33,000 men in excess!

The Committee report that 15,000 camels were destroyed, whereas it is now known that more than 50,000 have been destroyed‡. Here the report gives little more than *one-fourth* of the loss: and horses and other animals are not stated! The Committee report that the war has entailed a debt of £13,000,000. I have before § stated my conviction, that it will not exceed £7,000,000. I will not insist on the above estimate. The Government of India cannot know, for many months to come, the real amount, and if they do not know, how can the *home* Government know, and it may, with more reason be demanded, how can the *Committee* know! and if they do not, why do they deceive the public, by stating their report to be the result of the investigation of documents!

They next assert, equally upon assumption of facts, that the war has entailed a permanent charge of four and a half millions sterling! Now, a *permanent* charge must mean one of two things; either that we mean to keep the country at that annual charge, making the amount £18,000,000 for four years, or it must mean that the interest of the debt would amount to the above sum. A five per cent. loan has been opened, and is now closed, but if all the debt was even in that loan, it would only cause an interest of £650,000 a year, while the interest on the India Debt never reached £2,000,000!

The diminution of the means of culture, of transport, and of revenue, have also, the committee state, been caused by the war. I am not aware *what* culture the committee allude to. *Agriculture* has not been deficient; the land revenue has improved; *Sugar* has been manu-

* Whether of the *Shah's* or *Company's* troops is not stated.

† Calcutta Star, 6th December, 1842.

‡ Said to be 30,000, to the end of 1839, in Hough's Narrative of the march, &c., of the Army of the Indus I have since heard from Commissariat authority, that there were 50,000 camels lost; and the subsequent losses in Sindh, at Candahar, and in Nott's, Pollock's, &c., forces will make the number more.

§ Vide paragraph 2.

factured and exported to a greater extent than ever*; *Indigo* has been exported to a greater extent†; nor, except the famine of 1838, have we had any great distress among the natives.

As to the diminution of *transport*, as the army did not take many hackeries with them, we must refer the *term* to Camels. Now, with such a loss of camels, it must be recollected that many were procured in Sindh, the Punjab, at Candahar, and at Cabool; indeed, along the route of the army, to replace those which died, &c., and, as camels are not the *chief* means of transport in India, the Committee are mistaken in their conclusions, drawn from the war beyond the Indus. The grand article which is most easily disproved is the *Revenue:* this I am enabled to give the Committee from the Parliamentary Papers.

Gross Revenue	Co.'s Rs.	Excess. Co.'s Rs.
Bengal, 1836-37 to 1839-40	48,84,53,032	
1832-33 to 1836	46,89,77,244	
		1,94,75,788
Madras, ditto, 1839-40	17,43,80,523	
ditto, 1836......................	16,80,56,371	
		63,24,152
Bombay, ditto, 1839-40..................	9,62,18,925	
ditto, 1836	9,30,95,159	
		31,23,766
Total for India..................	Co.'s Rs.	289,23,706

The above contains the principal items of Revenue. I estimate that the six years of Lord Auckland's Government will give an increase of between 5 and £6,000,000 over the six years preceding his administration;—in fact, nearly *one million sterling* of annual increased revenue! The Committee could *not* have seen the above papers, or if they did, their conduct is worse than *erroneous!*

While on this subject I will give the state of the *India Debt:*—

1799—1800......	£10,190,528	after fall of Seringapatam.
1825......	30,743,238	
1826......	35,961,858	after the Burmese War.
1829......	40,942,721	
1831......	43,619,096	
1835......	33,984,654	when Lord Bentinck left.
1836......	29,832,299	when Lord Auckland arrived.
1838......	30,249,893	
1839......	30,231,162	

Now, by the Committee's showing, if the war cost £13,000,000 the debt now would be about the same as in 1831—but, the state of the treasuries at Calcutta, Madras and Bombay, are to be ascertained; because the debt is to be considered great or small as regards financial pressure, according to the amount of *cash* in hand: sometimes there are 9 and £10,000,000! Now, it is to be observed that there is

* 65,563 tons in 1840-41. In 1837-38, a little more than half the above quantity.—*Wilkinson's Exports.*

† More than 5,000 tons; in 1837-38, only three quarters.—*Ibid.*

another off-set—the interest of the debt, which has been much reduced of late years*.

9.—The Committee, also, describe the *Mussulman* population as rendered hostile to the British Government, by the war in Affghanistan. The Mussulman power was during the last century depressed by the Mahrattahs. The victories of Lord Lake in 1803, restored the Emperor of Delhi to his throne, and it is natural that the Mussulman should regret the loss of power, but the history of India will prove that to no *one* period is their dislike to be ascribed! It is not in the nature of things to suppose, that, if we lost India to-morrow, the Mussulman would ever gain the ascendancy; the Hindoos are so greatly superior in numbers, that in any native Government they would be paramount. The Committee further state that "causes of rebellion were developed by the pressure of *Taxes*." Now, we would ask what taxes they allude to. The Committee would lead those who are ignorant of India affairs to believe, that we had a *war-tax*: we have no such thing. The *land-tax* is the main-tax, and is the same in *Peace* or in *War!* As the Secretary of the Committee has been in Ceylon, *he* should have known better. An *Income tax* has been imposed on the people in England, not because of the war in Affghanistan, but on account of the state of the Revenue at home—for not one *shilling* has the home Government advanced or promised to advance to carry on the war.

I agree with the Committee in *one* point,—in their "conviction, that the *English nation* is bound to pay the expenses of this war." If not the whole, certainly half the cost of a war, which was connected with English and Indian objects, since whatever injures India must affect Great Britain, which derives so many advantages from the possession of British India!

The Committee in their objection to the policy of the war, quote the minute of a Director, in which it is objected, that the treaty of the 25th November, 1841, has been infringed. That treaty set forth, that we were not to interfere between Persia and Affghanistan, unless requested by both parties, and then only in regard to the arrangements of a peace. Now, the circumstances of 1814 and 1838 were widely different. In the former period there was a kingdom of Persia, and a kingdom of Affghanistan, to which Herat belonged. The latter having since become a separate state, could no more be considered, in 1838, as part of *the* kingdom of Affghanistan, than could Cashmeer, formerly also a part of it, which fell into the hands of the Sikhs in 1820. The treaty, therefore, has not been infringed. It has been cancelled by the breaking of Affghanistan into several divisions.

10.—The causes of the late reverses in Affghanistan will ere long be known. The trial of certain of the officers was necessary for three objects. 1*st.*—It is usual in the *navy* to try every Captain and other responsible person concerned for the loss of a ship, that evidence may be taken on oath, by which the true nature of the case may be shown to satisfy the Government and the public. 2*nd.*—It is necessary to clear the character of the officer whose conduct is often misrepresented, and a practice which prevails in the *navy*, should be adopted in the

* Principally 4 per cent.; the 5 per cent. loan closed on 4th January, 1843. In former years the loans carried 8 and 6 per cent.

army,—that the whole world may know how far there was neglect, or whether the surrender of a fortress, or other failure was warranted by existing and unavoidable circumstances. *3rd*—It is only by such trials that the Government, and the public can truly become acquainted with all the particulars relating to the transaction in question.

Now that the troops have returned from Affghanistan, the Government have directed* 10 men per Company from each Regiment of Infantry of the armies of the 3 Presidencies to be reduced,—this reduction will be a decrement of 15,200 men, and an annual saving of 12,76,800 Company's Rupees†. This reduction is warranted by the return of the troops from Affghanistan. This will still give more than 152,000 Native Infantry, and the Indian army will consist of more than 200,000 regular troops besides thonsands of irregulars; perfectly adequate for any present objects, and a large peace establishment, larger than we ever had; but the army had been too much cut down, after the conclusion of the capture of Bhurtpoor. We now learn this political and military truth, and must act up to it—that, "*to preserve Peace, we must be prepared for War.*"

The Indian navy having lately been improved by the employment of *steam* vessels of war, has produced many important benefits. *1st*—As a better protective navy for Commerce. *2nd.*—Expedition, and certainty in their voyages; and *3rd.*—As affording the means of quick transport for Troops, in case of a war with Burma—or, in any other quarter: and as, no doubt there will be some of Her Majesty's steamers in the Indian and Chinese seas—there will be the means, in case of danger, of throwing troops into the Mauritius, the Cape, &c.; and, supposing Egypt to be threatened, we shall have the ready means of supporting the Pasha; so that the introduction of a war steam navy is eminently calculated to act as a defence against invasion, a protection to the coasts of India, and becomes an adddional safeguard to our south-east frontier. Our north and north-west frontier will be defended by the troops at Kurnaul, Umballa, Sabathoo, Simla, Kussoulee, Loodianah, and Ferozpoor. Our west frontier will be protected by posts at Tatta-Rorree, Sukker, and Bukkur, while the sea port of Kurachee will defend the entrance into the Indus, by which river, troops can be poured into Sindh, either to defend it, or to join our troops in the north-west.

Our Magazines at Allahabad, Cawnpore, Agra, and Delhi‡, kept properly filled with plenty of guns, mortars, &c., of all calibres, and military stores, I would recommend the arsenal of Fort William to be merely used as a receiving depôt, keeping sufficient stores, &c., for any operations to the eastward, or for the supply of stations below Allahabad§.

11.—In reviewing, therefore, the state of British India at the

* G. O. P. C. 13th January, 1843.

† £127,680.

‡ There should be a good magazine nearer than Delhi is to the frontier. It is said that a Fort is to be built at Ferozpoor. There should doubtless be a magazine there to supply the corps in its neighbourhood, as well as, if required, the troops in *Sindh*.

§ Stores, &c., should always, when practicable, be sent up by water in the cold season, as less liable to losses on the river.

commencement of the year 1843, I am confident that our power was never so strong as it is at this moment! Our armies are of sufficient strength,—greater in numbers than at any former periods of peace. Our north and west frontiers have been strengthened. The Nipal frontier is sufficiently protected, because the late successes in China and in Affghanistan, will deter the Goorkhas from making any inroads into our territories;—they must well know that such an act would occasion the loss of their country. They must be aware that they are too much surrounded by posts on the south-east and west to be able to do anything. They can hope for no aid from the Sikhs or Burmese; and they will not make an effort to regain their lost territory at the expense of losing the remainder.

The *Burmese* are equally subdued by the successes of our arms in China, and to the west of the Indus. They know that we could now invade their country by steam war-vessels, and could pour thousands of troops on any one point, in a very short time, if we were to take the *proper season* for operations! The character of the British Government is too well appreciated by the *people* of the country, and by their *neighbours* to give *Tharrawaddee* any hope of success! Besides which, as an usurper, he has every thing to lose, and nothing to gain in any future struggle: we, now, know the country, the people, their customs, and their language. They know the advantages to be derived from peace and commerce—that if their king lost they would be gainers by the change of rulers, so that we should have the people on our side! If we reached the capital and the king fled, we should proclaim another king, if not take possession of the country*.

With regard to the invasion of India, which could only be *attempted* by *Russia*, we may quote the words of the *Times* in regard to that country and France. "In Russia, the will of the autocrat† directs the foreign policy of the empire without reference to public opinion; and in France public opinion itself is intoxicated by fits, till it rushes upon what in its cooler moments it most condemns. But even in those countries the *state of the finances, the interests of trade, and the security of property, are allies which cannot be detached from the natural coalition of the friends of peace; and it will require a more than ordinary share of human perversity and ambition to surmount the obstacles which they oppose to an irruption of brutal force and political crime.*" In proportion as the old leaven of society dies off, a new generation springs up, till at length there will remain but those who, having been born in peaceful times, will desire to live in peace, and to employ themselves in all the operations of the social system of the world. Thus, we see after a peace with France for nearly 28 years, the *Revolutionary* classes are departing to another world; the great European alliance is opposed to the principles of aggression; and the

* It is not, generally, known that after Lord Amherst heard of the fall of Bhurtpoor (18th January 1826), he sent instructions to demand 4 instead of 2 Crores of Rupees, and the cession of all the country up to Prome.

† It is only a few months ago, that the Emperor's life was endangered by the Act by which he designed to give freedom to the *Serfs* of Russia. This measure would naturally depress the influence of the nobility, and raise the former to a middle class, and thus form *a public* which must, sooner or later, prescribe limits to the ambition of even the Emperor himself.

good sense of the bulk of all nations is settling down into habits of peace and industry.

It seems obvious that the excess of the population of Europe will turn towards the new world, and that, as soon as the population shall arrive at a certain amount, and they become of sufficient consequence in the scale, that contests for power will raise *republics* into *kingdoms*, and transfer wars from the *old* to the *new* world! Asiatic nations will be slower in recovering their ancient position, since the European emigration will take with them the science of the west. So that though what has been borrowed from the *East*, will be returned from the *West*, with compound interest, still the event will be delayed, as the nations of the East have many prejudices to overcome, which the nations emigrating from the West are free from. Of all the nations in the east, *China* will take the lead in adopting European principles; because they are, already, the most learned, and most enlightened of all the nations out of Europe!

12.—I have already stated*, that agriculture has improved,—that the Revenue has increased. That Sugar, Indigo, &c., have been exported to a greater amount than formerly. Steam-vessels navigate the *Ganges* and the *Indus*, by which passengers, treasure, goods, troops, &c., can be safely and expeditiously transported, while some, who will see things through the medium of prejudice, maintain that India has been depressed by the war in Affghanistan. It is clear that the better informed persons in England—those who really know India, did not, and do not, entertain such desponding views. *East India-stock*, which is the *monetary-thermometer* of public opinion may decide the point. On the 7th March 1841, stock was at £247 per £100 stock; on hearing of the Cabool reverses it did not rise to £248! It was, on 4th November, 1842, at £257! Let us compare the position of India in 1803: the stock from 222½, fell to the 156†, and Company's paper was sold at a discount of 36 per cent. We then had all India arrayed against us;—with an army not half of its present numerical strength,—with little more than one half of our present number of European troops, the danger of our position was great.—The great native powers, of Scindiah and Holkar, were in full force,—their armies were commanded by French officers,—they had a powerful artillery,—a numerous infantry, disciplined after the European model;—the Nipalese and Burmese unconquered. The Islands of Mauritius, Bourbon, Java, and the Cape of Good Hope, in the hands of our enemies. French privateers in the bay of Bengal injuring our commerce. We were obliged to have ships of war to convey our fleets to and from India, and to and from China.

View now the present state of India. A well protected frontier;—ships importing produce in 1841-42—86, and exporting produce 61 per cent. above the years 1837-38;—an increase in the land and other Revenues of the country;—the resources of Assam being developed;—Tea cultivated in increased quantity, and of a superior kind, and other articles of commerce found in that country in abundance. The

* Para: 8.

† In 1784 it was, only 118½—just before the peace with Tippo. In 1786, it rose to 169½.—In 1792 it was 179 and 216.—In 1799—161 and 203. In 1824, it was 300½!

Court of Directors have recently ordered a splendid canal to be dug to connect the Jumna and Ganges rivers. This grand measure will cost 65 Lakhs of Rupees (£650,000), and the fact proves that the Court are anxious to improve India. This great, I will call it *national* act, will require some few years to carry it out. It will, when finished, be the means, under Providence, of preventing the recurrence of the famine which, in 1838, caused so much distress, sickness, and mortality;—it will be the means of irrigating the lands before dependent upon the periodical rains. It will perfect the internal navigation of Upper India, and afford a speedy and safe transit, for commerce, property, and for other purposes;—among which latter, will be the means of conveying troops with facility during the rainy season from different points.

Whatever improves the condition of India, must be beneficial to the inhabitants of the country. But there are those who will not accept of the good they find done for India—in giving to the natives a better government, better laws, better security for lives and property, education and other advantages. These fire-side objectors had better come out to India, and learn themselves, before they sit down to write about a country of which they know nothing from any good authority, and who condemn measures without reason because they do not fall within their scheme of government.

CORRESPONDENCE.

THE REV. KRISHNA MOHUN BANERJEA.

To the Editor of the "India Review."

SIR,—

Although you have but lately ascended the editorial chair, and are not necessarily bound to indentify yourself with the disputations and controversies arising from circumstances connected with the editorial management of your respected predecessor, yet I trust that you will not deem it inconsistent with the rules which you have laid down for your editorial conduct, to shew me the courtecy of admitting into the forth-coming number of the "*India Review*" the following observations, in reply to the letter of the Rev. K. M. Banerjea which appeared in your Dec. number. I regret that my communication could not be sent to you at an earlier period of the month. The reason is, that I had not an opportunity of seeing the *Review* until the forenoon of the 27th inst., and could not until to-day set apart a portion of time for preparing what follows.

In previously addressing the editor of the "*India Review*," although announcing to him, in my own name, that I was responsible for the letter signed P., I requested him to publish it with the anonymous signature; not that I wished to put forth anything to which I was ashamed to affix my own name, but purely from a feeling of reluctance to have my name before the public at all. On this occasion, I deem it but fair to the Rev. K. M. Banerjea to afford him the means of knowing the quarter whence the notices of his Autobiography have come. I can

assure him that it is with great reluctance that I make one single remark on what he has put forth, either in the Autobiographic sketch, or in his subsequent letter. I should not do so, unless a feeling of duty impelled me. In what follows, it shall be my earnest endeavour to avoid all expressions which can possibly be construed into indications of hostile feeling, or which, even by implication, can be made to convey unnecessarily offensive meaning. At the same time I feel that the most direct course is to call every thing by its right name. It appears that my former letter has excited varied feelings in the Rev. Babu's mind.—He has been "not a little flattered,"—"astonished," "still more surprized"—"grieved as well as surprized." If the astonishment, surprize and grief have been moved within him, on my account, the display of feeling, however kind, is perfectly unnecessary, as I shall endeavour to show.

I hope that, on calm consideration, the Rev. K. M. Banerjea will not continue to charge me with having "gone beyond the Christian privilege" in stating that it was morally impossible for me to believe that his impressions, or the statements conveyed to your predecessor, in consequence of them, were correct, because of the impressions of a *totally different* colour and character upon the minds of others, who ought to be well informed. I do not regard it as a breach of Christian privilege to state, with reference to matters which can be established only by moral evidence, that, of two conclusions, *that* is felt by my mind to be most correct which involves the least improbability. This is all that I meant by stating that it was morally impossible for me to believe the correctness of the impressions alluded to ; the Rev. Babu will not find me a very great advocate for human infallibility, whether claimed by universal Bishops, Œcumenical or General Councils, or by individual members of the Church. I have therefore no difficulty in admitting that not only are my friends and colleagues fallible men, but that this is the case with myself and every other mortal, not excluding the Rev. K. M. Banerjea. It did not strike me, therefore, for one moment, that I was transgressing very far in supposing, under certain conditions, that the Rev. Babu might possibly be entertaining erroneous impressions. He, in fact, acknowledges that such a supposition "is quite possible." If possible it might be entertained by me in preference to another supposition, also quite possible, but not nearly so probable, according to the view which I took of the subject. The case as presented to my mind, when I wrote the offensive sentence, was simply this:—The statements exhibited in the auto-biographic sketch, assigned reasons, for the Rev. Babu's baptism at Dr. Duff's house, which I had never heard before, but which, if they had existed I naturally supposed would, in the circumstances, have been made known to Dr. Duff. They were, however, as new to him as to myself. This then was the alternative before me ; I must come to the conclusion, either that the Rev. K. M. Banerjea must have allowed (unwittingly it might be) his episcopalian views to have given a somewhat new tinge to his impressions, or that, at the time of his baptism, he had not mentioned to Dr. Duff, which comes to the same thing as that he had carefully concealed from him his unwillingness to *identify himself with, his Dr. Duff's*, denomination. In looking at this alternative, I felt myself bound by charity and christian feeling to believe *rather*

that present impressions were incorrect, than that, of two reasons for being baptized at Dr. Duff's house, *one only,* and that to my mind the most natural as well as the most Christian, *should be specified at the time, while the other* thoroughly unknown to Dr. Duff, at the time, and therefore concealed from him, and not even conceived by him as possible, *should now, after the lapse of ten years,* be *brought forward as the leading inducement why the convert should have followed the line of conduct exhibited at his baptism.* The Rev. Babu will not, I trust, be greatly astonished at my using the words *carefully concealed,* seeing that he himself acknowledges that Dr. Duff may not have known that his convert was unwilling to identify himself with Presbyterians. How could my friend know, or even suspect any such unlikely state of mind, unless he had been candidly told, as he ought to have been, that it existed. Presbyterians are not advocates for any such *reserve* as is here indicated. I must now, however, allow the scale in the moral balance, which christian charity induced me to believe to be the lightest *to descend.* The Rev. K. M. Banerjea insists that he is the most competent witness in the case. Now that he has pronounced that opinion, after reconsideration, I must allow that, which to my mind, was previously arrayed in the greater amount of moral improbability, to be the more probable of the two branches of the alternative. That is, I must believe on the Rev. Babu's own testimony, that, although he did mention one reason to Dr. Duff, for being baptized at his house, he also had another reason, which, although not mentioned then, and not suspected by Dr. Duff to be either the *chief reason* for the conduct in question, or a reason for it at all, is notwithstanding the *chief* of the two, and after ten years is urged as such by the Autobiographer. Why this reason had not been mentioned to Dr. Duff at the time, in other words, why it had been concealed from him, is best known to the Rev. Babu, and those who may have been his advisers in the matter. But if this reason was concealed, that is, not mentioned—*kept in reserve* for an Autobiography or some such occasion, every plain straight forward man, must at one glance see that it is no great marvel that Dr. Duff all along, in the absence of any other evidence to the contrary, up to the Thursday evening before the communion Sabbath in St. Andrew's Church, regarded his convert as likely to become a member of the Presbyterian Church. If a young Hindu were to ask baptism at the hands of the Rev. Babu, assigning a natural as well as a generous and Christian reason for doing so, without so much as alluding to any other reason of mere expediency or mentioning any unwillingness to identify himself with the Episcopalian sect or denomination, it appears to me that the minister would naturally and justifiably conclude that the convert wished to become an Episcopalian. And if, after a few months, during which he had been accustomed several times every week, to see and converse with his ecclesiastical Father, upon the most vital truths of religion, he should all at once, and without having made his friend aware of the process going on in his mind in the interval, withdraw and join another denomination, should not the minister in question be held excusable for feeling a little surprized at the suddenness and unexplained nature of such a step?—and, if he continued up to that time under a distinct impression that a contrary result was to be expected, should he not be regarded as having judged candidly upon the best evidence presented

to him? In such circumstances, it were ungenerous in him to entertain suspicions that such a breach between himself and his convert would ever take place. On the other hand, the convert—by not frankly and candidly disclosing the state of his mind—by not making the christian friend, who, as a minister of Christ, had admitted him into the Church by baptism, cognizant of the views which he had adopted, and his reasons for differing from *him* who might fairly be regarded as entitled to the greatest manifestation of candour,—would certainly contribute in no small degree to strengthen previous expectations, on the part of his friend,—as to his own perfect willingness to associate spiritually with the members of that denomination, one of whose ministers had baptized him. He (the convert) would, by such conduct, most assuredly, whether designedly or undesignedly, *convey and strengthen such an impression.*

This brings me to the second expression which has been commented upon by the Revd. K. M. Banerjea, and which he assures us has caused him both grief and surprize. In my former letter, I asserted, on Dr. Duff's authority (although that fact was not then announced), that not only did Dr. D. know nothing of any unwillingness on the part of the convert to be identified with Presbyterians, until three days before the communion Sabbath at St. Andrew's Church, in the following January; not only was Dr. Duff ignorant of his having, at any time, previously communed with Episcopalians; but, that, on the contrary, he (the Rev. K. M. Banerjea) had all along conveyed the distinct impression that he looked forward with delight to his partaking of the ordinance, for the first time with his fellow christians in the Scotch Church," and had even attended the preparatory service on the Thursday. The Revd. Babu is grieved and surprized at the boldness with which I have made this assertion. There was no great amount of boldness needed to assert what I believe, upon the authority of the party receiving the impression, to be true. And upon reconsideration I have no doubt, that the Revd. K. M. Banerjea will see, that, were I disposed, I might justly charge him with having hastily misrepresented what I have written. When Dr. Duff affirms that such an impression did exist on his mind up to the date specified, the Revd. Babu will not surely deny that fact. That Dr. D. conceived he had grounds of some kind for the impression, will not I presume be denied. It turned out that the impression was a wrong one, but although it had from the first been merely imaginary, how could it have at all continued in my friend's mind, up till only three days before the celebration of the Sacrament of the Lord's Supper at the Scotch Church, had the convert been explicit and straight-forward in his communications with Dr. Duff. One frank avowal of difficulties regarding Church Government would have tended to obscure the *distinct impression.* One single word, after the convert's mind had "been satisfied that episcopacy was THE form of Church Government established by the Apostles," would have altogether dispelled the expectation, founded on the distinct impression, that he was about to commune for the first time in the Scotch Church. But no, the impression continued until the Thursday evening before the communion. It was then with surprize that Dr. Duff received *a hint* leading to an opposite impression; and on Friday morning the reason was assigned to be perplexity "on the subject of the ordination of ministers, and that, until that

point was settled in his own mind, he could not with satisfaction partake of the ordinance.". Was not this, even at the very last *conveying the distinct impression*, that his mind was not even then fully decided, and does it not show that if he often partook of the communion at the Old Church, he must have done so ere his mind was settled on the subject of the ordination of ministers.

In asserting that he had *conveyed the distinct impression* that he looked forward, &c. I have not accused the Rev. Babu, as he is pleased, without the least foundation, to assert, "of having deliberately conveyed a distinct impression to the contrary," of the fact of his having communed at the Old Church. I never disputed the fact. I only asserted that it was, at the time, unknown to Dr. Duff. Neither do I use the word *deliberately* at all, nor do I use the expression *on the contrary*, either in the sense or in the connection in which he charges me with using it. The Rev. K. M. Banerjea gets credit for understanding English very well. On looking again, he will find that I have not charged him with deliberately conveying a distinct impression to the contrary of the fact which he avows, and for the truth of which, I doubt not, he could produce many evidences. What I have had "the boldness" to assert is this;—*On the contrary* (that is, so far from the fact now avowed being then known to Dr. Duff), *he* (that is the convert) *had all along conveyed the distinct impression*, &c. Now your correspondent must allow that impressions are conveyed in many ways—not only by deliberate falsehood—not only by direct endeavours to deceive—but also by *mere silence*, by *the want of frank communication, by reserve.* Had I dared or wished to accuse the Rev. Babu of deliberately declaring what is false, or contrary to fact, there were no need of the circumlocution used; I might just have stated the accusation, by declaring, in the phraseology generally used by those who deal in such language, that such was the fact. But let your correspondent be well assured that my words are not capable of conveying the meaning which he puts upon them. I have said nothing of "*deliberately* conveying a distinct impression to the contrary" of a well known fact. I have not supposed him "capable of having deliberately conveyed so false an impression. And I must add, that his charging me with having done so is utterly gratuitous, and the charge must have been made without due or calm consideration. I have said that he had *conveyed a distinct impression* to my friend's mind that he was looking forward to communing for the first time at the Scotch Church. It has not been asserted whether the impression was conveyed *designedly* or *undesignedly*, and I do not feel that I have grounds which enable me to form an opinion, nor do I deem it necessary to say more, than that I hope your correspondent was, and is, less implicated in the design of keeping Dr. Duff ignorant of the real state of his mind, than his own statements would lead one to suppose.

With regard to your correspondent's declining, *for decency's sake*, to continue in the lists with me, I have only this much to say, that he must of course judge for himself, in that matter. I do not, however, think it the fairest way to get rid of an opponent, to make an unfounded charge of ungenerous or unchristian conduct, and then back out of the lists for decency's sake. The Rev. K. M. Banerjea is not the first controversialist who has left open a loop-hole for escape in this

way. If, however, for decency's sake, he do abandon me, on the arena, unopposed and alone, let the spectators judge between us. I trust my reputation for fair dealing, such as it is, will survive his haughty abandonment of me.

I still beg your indulgence, while I further call your attention, for a little, to the facts of this case as they have been presented to me. My information has been derived from my friend and colleague who was one of the principals in the transactions which have called forth so many remarks. If I detail them wrongly, I shall be willing to stand corrected by him..

In writing a memoir of himself it was of course proper for the Rev. K. M. Banerjea to introduce, not only an acconnt of his baptism, but, also a statement of his subsequent preference of the Episcopalian form of Church government to the Presbyterian. No one has any right to complain of his doing so ; on the contrary, I should have thought the sketch incomplete without it. But when reading the following passages :—" He had long been thinking on the subject, and had heard in course of *consideration*, what the Episcopalians and the Presbyterians urged in favour of their respective opinions."—" The Presbyterians evaded the conclusion by pronouncing, &c. ;"—it struck me that many might he led to the conclusion, that Dr. Duff, who had been the means, under God, of directing the Rev. Babu's " attention to the grand truths of the gospel," and who had, at the converts own solicitation, officiated at his baptism, had also been allowed an opportunity of entering fully on the subject of Church government. Who were the Presbyterians to whom the Rev. Babu applied for information,—who urged their opinions,—who evaded the conclusion which he deems so self evident and decisive in favour of Episcopacy? Eight years ago, I could not, after making diligent inquiry, find out upon what grounds of argument, the convert had been induced, so soon after his baptism, and rather unexpectedly on the part of his Presbyterian friends, to decline holding Church communion with them. That he had grounds which to him appeared quite sufficient, I never doubted ; but I firmly believe, upon the best authority that can be had on such a subject, that neither Dr. Duff, nor any other Presbyterian minister, had, up to the time of the converts withdrawing from the Scotch Church, at all entered with him upon the question of Church government, with a view to discuss it fully. So that, if he had at that time " been satisfied that Episcopacy was THE form of Church government established by the Apostles," he had obtained satisfaction without any reference to those Presbyterians who were likely to be the best qualified to shew their side of the question, and to whom one would most naturally have expected him to have applied for information.

The following are statements of fact repeatedly made to me by my friend and colleague.—Dr. Duff was completely ignorant until the appearance of this autobiography, of the convert's unwillingness either before, or for about three months after his baptism, to identify himself with his (Dr. Duff's) denomination. Dr. Duff was absolutely ignorant of the converts having, at any time previously to the period at which the Sacrament of the Lord's Supper was usually celebrated in St. Andrew's Church, ever partaken of the bread and wine, in that Holy ordinance in any other Church. Dr. Duff had the impression

that he was to commune, for the first time, at the Scotch Church, and is ready to substantiate what I now state by his own testimony.

That, previous to the time of celebrating the Sacrament, of the Lord's Supper at St. Andrew's Church, the convert's mind "had been satisfied that Episcopacy was THE form of Church Government established by the Apostles," was altogether unknown to Dr. Duff; else instead of expecting him to join in the Communion at the Presbyterian Church, as he did expect him to do, he should have been astonished at his doing so, while doubting of the Scriptural authority, of the officiating minister to dispense it. As to the conversation to which the Rev. K. M. Banerjea alludes, as having taken place, between Dr. Duff and himself, after the Bishop of Calcutta had preached his first sermon in the Old Church, this much may be said:—when the convert stated how much he had been edified by the Communion, Dr. Duff must have understood him to mean that he had been edified by hearing the Communion service read from the Liturgy;—or that having been present during the celebration of the Lord's Supper, he was edified by witnessing the observance thereof. But I have nothing to do with the explanation of this point. I only assert the ignorance of Dr. Duff regarding the previous acts of communion, and I do so upon his authority. He must be allowed, surely, to be as competent a witness of his own knowledge or ignorance of a fact, as the Rev. Babu, who calls in question the correctness of my previous assertion, is to bear witness of his own thoughts. Dr. D. has assured me, again and again, that nothing said, at any time previous to the celebration of the Lord's Supper at the Scotch Church, so often alluded to, conveyed to his mind the intimation that his convert had been in the habit of communing, or had even once communed, either at the Old Church or at the Cathedral.

Soon after his baptism, the convert made an allusion to Church Government, and expressed a desire to obtain information on the subject. Dr. Duff proposed that he should commence a regular course of Theological study, and that the subject of Church Government, second in point of importance to the great questions of Theology, should be taken up in due course. To this advice the convert appeared to accede, and had actually commenced the course. He was frequently with Dr. Duff, and up to the period at which he declined "identifying himself" with the Presbyterian denomination,—refusing to take the Communion from the hands of one ordained "by the laying on of the hands of the Presbytery," although he had already received baptism from one similarly ordained,—the Missionary and his convert had frequent conversations concerning the Sacrament of the Lord's Supper, but very seldom were allusions made to the forms of Church Government. The Missionary regarded the question as tacitly reserved until the more important points of Theological study had been considered. It was not meant to evade it. Presbyterians do not plead guilty to the charge of contriving hypotheses, or of disregarding Church history for the purpose of upholding their system. One notion they do entertain which some persons repudiate. They maintain that the Apostolic doctrine and practice are more correctly exhibited in Apostolic inspired writings than in the tones of those venerated Fathers, who too often show their incapability of guiding us to the meaning of some of the simplest passages of scripture. I shall not, however, enter upon the discus-

sion of the question of Church Government, at present; your correspondent does not call forth any thing more on that subject, and I did not come to this country to proselytize Episcopalians, I had rather live with them in Christian harmony than agitate the points of difference between us.

I am, yours truly,
D. Ewart.

Wellington Square, January 30th, 1843.

SUGGESTIONS FOR IMPROVING THE FORT PLAIN LAMPS.

To the Editor of the "India Review."

Dear Sir,

Those who on dark nights have had to travel between the mercantile quarter of Calcutta and its various suburban neighbourhoods of Bhowanccpoor, Alleepoor, and Kidderpoor—to or from which the roads bisecting the Fort Plain are the common route, will be well aware of the extreme difficulty of preserving the right course.

The various cross roads referred to are very properly lighted by lamps, but these instead of *guiding*—too frequently *mislead* the unwary traveller, who seldom discovers "the error of his ways" till "*brought to*" by a pond, ditch, or railing!

The *how* and the *why* of these frequent wanderings from the right road, it would be difficult to clearly describe without the aid of a diagram, but as the *fact* must be well known to those who alone can be expected to take an interest in the subject, I will at once proceed to the direct object of this communication—the suggestion of a remedy. This is simply.—

1st. To close with tin that side of each lamp (the corner lamps excepted) next the plain or common; which alteration would effect the double advantage of casting additional light in the direction alone required, and no longer leaving a traveller in doubt as to the side of the lamp on which to find the road.

2nd. To glaze the lamps of different roads with different coloured glasses, or at least to glaze the corner lamps with coloured glass, on the side panes of which the direction of the two distinct roads, indicated in legible roman letters thus—

☞ Government House. Alleepoor ☜
Jail. ☜ ☞ Fort.

and so on, according to the locality of the roads, would be a most serviceable improvement.

I, of course, assume the angle of each corner lamp to coincide with the angle of the two roads, and the other lamps to have their tinned or dark sides parallel with the roads on which they stand.

The corner lamps would need some distinction capable of being discerned in the distance, and therefore, I think, should be glazed on all sides; and it were better, perhaps, if the coloured (say green) glass were confined to the two sides facing the plain, as the lettering on white panes might be clearer.

It was my intention to have addressed this letter to one of the daily papers, but, under the opinion that the subject is more likely to receive from a Mechanic's Journal (if such I may consider your Review) that editorial aid which crude suggestions like mine need to render them worthy of adoption, I address you in preference; and trust that your notice of the subject (to the *rejection* of this communication if you think *Editorial* notice alone sufficient) will induce speedy attention, in the right quarter, to an evil which I fear is not confined exclusively to the plain of Fort William.

The frequent night accidents consequent to the evil noticed (all of which do not like a recent case, find their way into the daily papers) might be lessened, if not altogether prevented, by some municipal attention to the subject of this letter, from

Your's faithfully,

H.N.P.

Alleepoore, 1st January, 1843.

[We feel greatly indebted to our correspondent for the foregoing communication on a subject so important as that to which it refers, and not less for the reasons which are assigned for his selection of the Review as the medium of appeal. We can assure him that *such* "crude" suggestions on matters affecting the public safety will be always welcome; not indeed, for the reasons our correspondent so modestly assigns, because we are satisfied that his suggestions cannot be either more clearly or more appropriately conveyed or enforced than in his own words; —but, because, we are anxious to render the Review the medium of whatever may be calculated to improve, advance and increase the public good.

Of the necessity of adopting some measure for the prevention of accidents there can be no question; we have ourselves more than once experienced the want of some better guide and guard than can be found on the roads referred to. The plan proposed by our correspondent appears to us both simple and efficient, though we fear a very cogent objection may be raised on the score of economy as regards even the *paticular* use of coloured glass: it is expensive in this country.—we otherwise heartily approve of the remedy proposed, and trust that it may excite the attention of our city Magistrates, from whom the "lives and safeties all" of travellers by day or night claim some consideration. In order that it may not escape their observation we have done ourselves the pleasure of forwarding to the superintendant of roads a copy of the letter.

Should it meet with the attention it deserves, our correspondent will we trust scarcely regret that he has at any time incurred the risk or even the penalty of a ride in the dark, but will console himself with the reflection that if there be truth or reason in the assertion of a talented contemporary, that it is advantageous for a master in equity occasionally to run the risk of being drowned, pro bono publico, it cannot be a whit less beneficial or patriotic in a private Gentleman who incurs an equal chance of breaking his neck.]—Ed.

REVIEW.—LOCAL.

The Calcutta Journal of Natural History. Conducted by John M'Clelland, B.M.S.

We have been favoured with the 12th number of this interesting Journal.

The first article of our cotemporary is the

"Description of Camptoceras, a new genus of the Lymnæadæ, allied to Ancylus, and of Tricula, a new type of form allied to Melania. By W. H. BENSON, ESQ., Bengal Civil Service.

Family.—HELICIDÆ, Swainson.
Sub-fam.—LYMNACINÆ, Sw.
Genus.—CAMPTOCERAS, Nobis.

Testâ elongatâ sinistrorsâ, anfractibus paucis, productis, haud connexis, spirâ saliente-subrectâ; aperturâ oblongâ, liberâ, integrâ; peristomate acuto, continuo.

Animal. Tentaculis duobus filiformibus obtusis munitum; oculis magnis inter tentacula sitis; proboscide mediocri; Pallio labia testæ haud transeunte. Pede brevi longitudinem aperturæ vix superante.

C. Terebra. Testâ diaphanâ elongatâ, anfractibus tribus compressis biangulatis, transversè striolatis, lineis longitudinalibus depressis decussatis.

Animali fuscato, versus spiram rubescente.

Of Tricula, Mr. Bensons writes—

"We here also re-discovered the new Trochiform, Planorbis, which we had taken at Bhimtal, and this shell was similarly deficient in the other waters of the neighbourhood.

Fam.—TURBINDÆ.
Sub-Fam.—MELANIANÆ.
Sub-genus.—TRICULA, Nobis.

Testæ spirâ elongatiusculâ. aperturâ obliquâ, ovatâ, integrâ susupernè angulatâ; peristomate continuo, subreflexo; anfræctu ultimo subumbilicato.

Animal. Melaniæ simile, proboscide elongatâ, anticè emarginatâ, tentaculis filiformibus duobus oculos posticè prope basin gerentibus; pede mediocri ovato, anticè subquadrato. Operculo corneo subspirali.

T. Montana. Testâ olivacieâ ovato-conicâ, anfractibus sex retundatis, suturis impressis, aperturâ intus albidâ, peristomate nigrescenti; apice obtuso, plerumque decollato.

Hab: In rivo, apud lacum Kunavurensem Bhimtâl dictum."

The second article is entitled, "Rough notes on the controversy against Geologists, carried on by those who adopt the meaning which was formerly assigned to the first Chapter of the book of Genesis. By Andrew Robertson, Medical College, Calcutta."

Its object is to defend Geologists, on the charge of infidelity, sometimes brought against them by those who think that the direction which the science has taken is unfavourable to a literal interpretation of some passages of Scripture.

The third article is we suppose a contribution by the editor. In "Notes on Rajmehah coal," it is said that coal has been found by Captain Tanner, at Sicrigully, on the banks of the Ganges, and at Hurrah, twenty-five miles distant. Subsequent research has thrown doubt on the first discovery. The second description of coal is of inferior quality, its effect being only half that of Burdwan coal. It is also stated in a report to Government by Colonel McLeod and Major Forbes, that Mr. Ward of Bhaugulpore was aware of the existence

of coal in a bed of sand-stone near the pass of Patchwary. We take the liberty of quoting one passage more from this interesting article, referring those who require the curious information it affords to the original source.

"4. In addition to the above-mentioned indications of coal, extensive beds have been found in a fourth locality, a few miles south of Patchwary. In April, 1838, Mr. James Pontet found a bed of coal in the Rajmehal hills, on the banks of a nullah called the Burmany, sixteen miles distant from water-carriage during the rains, and about thirty miles west of Moorshedabad, and nearly in the line of the canal proposed by Major Forbes. A specimen of this coal afforded the following results on analysis :—

Specific gravity 1.370				
Volatile matter	... ...	42	0	0
Carbon	... ...	44	8	0
Earthly matter	... ...	13	2	0
		100	0	0

Mr. Pontet has reason to think that the Burdwan and Rajmehal beds are connected.

The fourth article is an "Extract from the memoir of M. Peliget, on the analysis of Sugar-cane, and other documents relative to the manufacture of sugar. This paper is of the greatest importance to refiners, whom we refer to it for much information of the same character as that contained in the following quotation.—

Authors who have written on the cane, and the art of extracting its sugar, furnish information altogether erroneous regarding the real nature of this precious plant. In fact, no exact analysis of the cane, or of its produce had been made or published when, in 1822, Vauquelin attempted to fill the blank by procuring from Martinique some cane juice (or vasou) preserved by Appet's process. Unfortunately, this process, at that time new and no doubt ill-managed, did not succeed in effecting the purpose of that celebrated chemist. The vesou arrived in a state so altered, that it had lost its ordinary properties, and Vauquelin was obliged to confine himself to making known the singular substance into which the sugar contained in the liquid had been transformed, in consequence of viscous fermentation.

M. Gradis, a merchant of Bourdeaux, proposed about a year ago, to procure for me some cane juice and canes, that by the examination of those bodies, light might be thrown ont some points in the manufacture of colonial sugar. I eagerly accepted this offer, and I lately received these substances preserved by the very simple processes I had prescribed. These were—the desiccation of the cane at a low temperature, and the employment of Appert's process, now everywhere well understood, for the preservation of the cane juice.

The vesou which I have examined, was obtained in the ordinary way by expression from the pure cane, was immediately introduced into common bottles, which were gradually raised to the temperature of 212° F. and then corked and cased in pitch. The operation succeeded perfectly. The vesou in the eight bottles that have been sent me, presents, according to the Planters who have examined it, all the characters of the ordinary cane juice. It is a cloudy liquid of middling fluidity, holding in suspense that greyish globular matter that is found in the expressed juices of almost all vegetables. It is known, that when sugar is also present, this matter acts as ferment, and transforms it into that viscous substance described by Vauquelin. By only raising the temperature to 212° Fahr., that to which this vesou was submitted, the organisation of this substance is destroyed, and it actually loses its fermenting property.

The density of this cane juice is 108.8, corresponding to twelve or thirteen degrees of Beaume's areometer.

It yields a balsamic odour peculiar to the cane, and which is so marked in raw colonial sugar. By filtration through unsized paper it is obtained limpid, and has then a very clear citrine tint, but whether opaque or transparent, it undergoes no alteration by long exposure to air.

Evaporated at a gentle heat after having been filtered, it becomes a syrup, which placed in dry air, furnishes after some days a hard, crumbling, colourless mass, *and this mass consists of crystalized sugar almost pure.*

The analysis of this liquid is therefore remarkably simple, for it consists merely in evaporating a given weight in a capsule, which is again weighed when the substance has become solid and quite dry.

We arrive at the same end, still more surely, by evaporating the liquid at the ordinary temperature under the receiver of an air-pump only, and it is a fact deserving attention, that the thickest syrup that can be thus obtained, does not crystalise even after the lapse of many days. The addition of a small quantity of alcohol appears necessary to determine the crystalization, which then becomes complete in a few hours. This effect is probably due to the coagulation of the vegetable albumen which exists in very minute quantity, as we shall presently see.

I have ascertained by the common processess, the other substances that exist along with sugar in the cane juice. By evaporating a given weight of vesou, and incinerating the residue, we get 1·3 per cent. of white ashes.

These ashes consist of sulphate of potass, lime, alkaline chlorate, and other salts, found in the sap of almost all vegetables.

The sub-acetate of lead which precipitates all organised substances except sugar, and which produces especially so considerable a precipitate from beet-root, causes only a slight quantity of greenish deposit from cane juice. Admitting vegetable albumen to be the organic substance united to oxide of lead that forms this precipitate, it hardly amounts to a two-thousandth part of the weight of the cane juice.

Accordingly, the vesou I have analyzed is composed of

Sugar	20
Mineral salts and albumen	1·5
Water	78·5
	100

The juice of the cane may therefore be considered as an almost pure solution of sugar. This appears to be an important result, for without admitting, as was formerly alleged, the pre-existence of molasses or uncrystalizable sugar in the cane juice, it might still be supposed to contain some substances, the presence of which hinder the crystalization of some portion of the saccharine matter.

It is well known, that in the manufacture of sugar from the cane, there is always a considerable quantity of molasses formed, amounting sometimes to one-third of the sugar obtained. It seems that the production of molasses may be much diminished, or may entirely cease, by recourse to more perfect heating apparatus.

One of the great dangers in the manufacture of cane sugar appears to consist in the rapid fermentation that the vesou undergoes if exposed for some time to the air. This alteration, which destroys so great a quantity of sugar, may probably be escaped by speedily raising the temperature of the juice as soon as expressed to 212° Fahr.

In defecating the juice by lime in the ordinary way, and evaporating it at a rapid fire, I have also obtained the whole of the saccharine matter in a solid state, without a trace of molasses.

The canes that I received with the vesou had been cut in bits and dried in an oven at 140° Fahr. M. Faraud, apothecary at Martinique, who undertook this double preparation, obtained 7 kil. of dry cane from 24 of the fresh. The desiccation, however, was not complete, for on submitting them to the temperature of 212° Fahr. in a stove, they lost 9 or 10 per cent. more in weight.

Accordingly, the fresh sugar cane contains solid matters	28
Water	72
	100*

* If the 7 kil. to which the 24 kils of fresh cane were reduced by the first drying lost 10 per cent. by the second drying, there remained only 26¼ per cent. of the original weight, not 28.

In treating the dried cane, either by hot or cold water, the sugar is separated from the insoluble or ligneus matter. We thus find that the dried cane contains of soluble matter .... 64·7
Ligneous matter .... 35·3

100

From the analysis of the vesou, it appears that these 64.7 parts of soluble matter consist almost solely of crystalizable sugar.

From these numbers besides, we may easily deduce the relative proportions of the three principal constituents of the fresh cane ; these are water, ... 72·1
Sugar 18
Wood .... 9·9

100

The sugar cane then contains in theory 90 per cent. of juice, but so difficult is it to crush, and so spongy is its texture, that at Martinique it seldom yields more than 50 per cent. on an average.

Probably with better machines, and by crushing the bagasse (or cane trash) a much larger produce might be obtained."

Mr. G. J. Gordon, by whom the paper is communicated, concludes with the following remark :—

"It is quite clear that the substance, the presence of which gives rise to fermentation in the cane-juice loses this deleterious property by simple exposure to the boiling temperature in 212° F. But further, Peligot found that not only the cane-juice that had been raised to that temperature shewed no disposition to ferment, but that the cane itself, after having been exposed to the same heat in a stove yielded its sugar to either hot or cold water without a trace of molasses. The principle is one of easy application, requiring only that a boiler be placed immediately under the rolling mill, into which cane-juice and cane-trash may be allowed to fall in the first instance, leaving a spout at one extremity from which the cane-juice may be drawn and thence carried to the boilers, while the cane-trash is brought to a state in which it will yield much of its remaining saccharine matter to fresh pressure, without being liable to fermentation.

The remaining articles are :—

V.—Extract of a Letter from Dr. Lund, on the Brazilian Ant.

VI.—M. E. De Beaumont's Views of the relative Age of the European Mountains, an abstract by Professor Schow. Communicated by W. M. Wetermann, Esq.

VII.—Observations on the Genus Spahium. By M. P. Edgeworth, Esq.

VIII.—Extract of a Letter from Father Joseph Gury, S. J., to his brother.

Extract of a Letter from Father Smet, Jesuit Missionary, to the Reverend Father General of the Society. The Assam Tea Plant.

IX.—Twelfth Meeting of the British Association, for the advancement of Science ; Manchester, 22nd June, 1842.

X.—Abstract of M. Fourier's Theory of Heat.—From "The Revolutions of the Globe Familiarly described," by Alexander Bertrand, M. D.

General Report of the Council of Public Instruction, of Bengal for 1841 and 1842.

Agri-Horticultural Society's Journal, and India Review.

XI.—Indian Coal.

Extract of a letter from the Editor of the Calcutta Journal of Natural History to Charles Lyell, Esq. F. R. S., dated 10th February, 1841.

XII.—Collections,

XIII.—Meteorological Tables.

The Bengal Almanac for the year 1843, *compiled and arranged by Samuel Smith and Co., Calcutta, printed and published by the proprietors at the Bengal Hurkaru Press,* 1843.

We regret that this Almanac does not appear before the commencement of the year, as we know that this tardiness is, with some of the public, a motive for giving the preference to its competitors, who some how or other always have the start of it. The printing too is bad: for instance, in the month of January we have been obliged to insert, in manuscript, in our copy, many figures which were wanting or not effective.

The astronomical portion of this work, and also that which relates to coins, weights and measures, we have had frequent occasion to consult and use, and are therefore in the gratifying position of being able from personal experience to recommend this department of the work to the notice of our readers. There is also a statement in the order of time of the events of the year as recorded in the Hurkaru newspaper, and which, containing (as we believe) much that is doubtful both in fact and opinion, requires modification to make it fit for any other purpose than serving as an index to the above Journal.

CULTURE OF COTTON AT RUTNAGHERRY.

The Annual Report of the transactions of the Bombay Chamber of Commerce for the official year 1841-42, presents, amongst other matters already noticed in the last number of the "India Review," an interesting paper relating to the experiments made by Mr. Elphinstone at Rutnagherry in the cultivation of Cotton.

In answer to enquiries made by the Chamber, Mr. Elphinstone states his belief that a certain Cotton, "concanee," of which he had forwarded a specimen to the Chamber, was of an indigenous kind: the quality it would appear was of so fine a character as to warrant one of two conclusions, either of which must be considered as important to the interests of India.—viz., either

1st. That the climate and soil of this particular province are peculiarly favorable to the growth and cultivation of foreign seed, a fact which the abandonment of the experiments at Broach seemed to go far in contradicting—or

2ndly. That India possesses a valuable Cotton of its own.

From the strong resemblance which the "concanee" cotton bears, "both as regards staple and the appearance and character of the plant, to the Cotton found growing at Kaira in Guzerat by Dr. Burn," by him considered to derive its origin from Bourbon seed, a question naturally arose on the probability of this Cotton being the product of one of the many experiments which during nearly 50 years have at various periods been made in different parts of the country. Mr. Elphinstone, as we have stated, leans to the impression that the concanee is indigenous, and, in assigning the grounds on which that impression rests, refers to the fact that one experiment only, in 1817, was made at Malwan with Bourbon seed, the result of which as far as he could ascertain, was of a

different character to that produced at Rutnagherry. Mr. Elphinstone also mentions that in a work entitled "*Reports on the culture of Cotton Wool, Raw Silk and Indigo in India,*" published in 1836, it is stated in a letter, dated 1818, p. 74, that the culture of Cotton has been introduced in the islands of Bourbon and Mauritius within the last 30 years, or 53 years, from the present period; and, on the other hand, from the evidence he has received from persons of veracity, the "concanee" has existed in this country for at least 60 or 70 years. Assuming these as facts, Mr. Elphinstone infers, that if the Bourbon and the "concanee" be proved of the same origin, the seed must have been taken from this country, not brought to it from Bourbon; or in default of such proof, which is equally probable, that they are different plants. Mr. Elphinstone had submitted some of the seeds of this variety to Dr. Gibson, superintendant of the Company's Botanic Garden at Dapooree, for examination, with a request that he would state to what kind it belonged. "I believe," says Mr. Elphinstone, "he could not determine that point satisfactorily, but thought it was of the same species of plant as one he had seen in a hedge at Seroor." These, and the simple fact that it is found dispersed over the country almost in a wild state, lead Mr. Elphinstone to the conclusion that it is the staple of India and not an exotic. Be this, however, as it may, one of two important conclusions is arrived at—either that India can produce a good Cotton, or that foreign Cotton does not always degenerate in this country as has been generally reported.

The opinions of the home brokers on the "concanee," or as the Chamber has denominated it the "naturalized Bourbon," are highly satisfactory.

A memorial on the subject of resuming the abandoned experiments at Broach had been presented to the Hon'ble Court of Directors by the Chamber of Commerce, detailing the various causes which had contributed to the failure of the experiments, a moiety of which, it is said, was attributable to defective management. The memorial was favourably received and it has been determined to resume the experiments with the aid of two American planters, under the superintendance of Dr. Burn.

The Bombay Government has also, "bearing in mind the views and orders of the Hon'ble Court of Directors," conceived the expediency of adopting the recommendation of the Revenue Commissioner, and have authorized Mr. Elphinstone "to prosecute his experiments on an extended scale on account of Government, so that more information may be collected on the subject, and a knowledge of the culture, as well as the advantage to themselves of engaging in it," may be imparted to the Ryots. For these purposes the Hon'ble the Governor in Council has been pleased to place 10,000 rupees at Mr. Elphinstone's disposal, at the same time conveying to that gentleman the thanks of the Government for the public spirit and laudable zeal with which he has carried on his experiments.

A course of Mathematics; principally designed for the use of Students in the East India Company's Military Seminary at Addiscomb. By the Rev. John Cape, 8vo., 2 vols.

Our attention has been drawn to Mr. Cape's work from that part of its title which expresses that it is intended for the use of those who are to be the engineers and artillerists of British India. As far as the latter are concerned, no alterations need be made on a course of natural Philosophy for their use. That the laws of motion taught in the seminary at Addiscombe are applicable in India is one of the best evidences of their truth, and we dare say the Professor lays sufficient stress upon it in his lectures. The only addition required in a work to be used in this country is, that of a few numbers which are constants locally only, such as the expressions for the intensity of gravity, &c. and we believe that the differences between these and the corresponding expressions in our native latitude are so considerably within the inevitable errors of practise, that no officer thinks it absolutely necessary to consider them in his computations.

But in engineering, where so many of the calculations must be made from numbers which obtain here only, and are quite empirical, we think the purpose of the work should have been more conspicuous. Nor do we approve of the length of that part of the course which is devoted to the higher Algebra;—equations above the second, for instance, in which a particular relation subsists amongst the roots of some of them. These are properly part of a general mathematical education, such as is obtained in universities, but are hardly,—why should we not at once say,—not at all, required by the practical man. Mr. Cape has been led out of the line of practical utility by his Cambridge partialities. It is. however, fortunate for those whose mathematical studies will be nearly confined to the prescribed course of the institution in which they are educated, that its composition has fallen into the hands of a man like Mr. Cape. His work contains all that is useful, with the exception we have suggested, and he treats with taste, logically, and in a philosophical spirit, every subject that is within his scope. Hence his work is better than that of Hutton, even as amended by Gregory and Davis, and far superior to the misnamed "complete" courses of Darby, Nicholson, Gregory and other mere working mathematicians. We recommend the book to those, who requiring no very profound knowledge of mathematics, intend to restrict their excursions in the exact sciences to the limits of a single work. Those who read French, and have these views, will do well to acquire the Cours de Physique and Cours d'analyse prepared by the Professors of the Ecole Polytechnique for the use of the students in that establishment.

MESSRS. G. H. PALMER AND CHARLES PERKINS' IMPROVED PISTONS AND VALVES FOR RETAINING OR DISCHARGING LIQUIDS, GASES AND STEAM.

[Plate 1 Figs. 1 to 4.] The present improvements are brought before the public by the patentees, with an expectation that they have succeeded in making one of the most important articles of use, in the simplest form and of the most durable construction. Every one is aware in how many ways the pump is conducive to human operations, as well as the many casualties to which it is subjected by the manner in which, and the materials of which, it has hitherto been made. The action of a pump is derived from one or more valves opening upwards in the lower or fixed bucket (commonly called the clack), and from one or more valves also opening upwards in the upper or moveable bucket. These valves are either made of leather, or their motion (when not so made) is insured by hinges, or connexions usually made of the same material. The upper, or moveable bucket, moreover, in order to produce a vacuum beneath it in its ascent, is backed or fitted to the sides of the working barrel of the pump, either with leather or hemp—materials which are liable to be affected by differences of temperature in different climates, subject to the attacks of incrustation, to the operation of many wasting influences, and above all, to a rapid deterioration either from use or disuse. The moment these perishable adjuncts to the operation of a pump are out of order, the machine itself becomes useless.

Impressed with these facts, and having themselves suffered from their costly disappointments, the patentees, after many fruitless endeavours, hit upon the expedient of producing the desired action in a pump barrel by the substitution of two simple elliptical metallic discs for the complex and perishable packed and valved buckets previously in use; when (the natural consequence of every simple contrivance for a specific purpose,) they found all the evils of the old mode removed, and many advantages derived which were not before considered as obtainable.

To explain this invention more precisely: The pump barrel is fitted with two metallic discs, the lower one a fixture, the upper one connected to, and moving with the pump rod. These discs or pistons, are made elliptical, by being cut diagonally out of a solid cylinder of the same diameter as the pump barrel. They lie inclined in the barrel and although in that position, they fit the circle of the barrel with the greatest accuracy, yet, by fixing the lower disc upon a spindle, and attaching the upper disc or piston to the rod *at points which divide the whole area of the discs into two unequal areas*, as soon as the machine is set in motion, and the upper piston is drawn upwards by the rod, it leaves a vacuum below it in the working barrel when the fluid below from its tendency to rise into the vacuum, presses equally over the *whole surface* of the under side of the lower valve; in consequence, however, of the eccentric suspension of the lower valve, there is a greater amount of pressure over the larger area of the two into which the surface is divided, and this extra pressure causes the valve to vibrate on the spindle, and in so doing, forms a passage for the fluid. When this up stroke is completed, and the upper disc (which we will call the piston) is pressed by the rod to effect its descent, the lower disc (which we will call the clack) is then closed by the amount of extra pressure of the water on the upper side of its larger area, and the same principle which opens the clack, acting on the under side of the piston, it is disengaged from contact with the barrel, excepting at two infinitely small points (the imaginary termination of its minor axis) presenting a very small surface in its descent through the fluid which had already passed the clacks. As soon as this down stroke is completed, and the up stroke commenced, the piston returns to its oblique position, lifting and discharging the fluid. A power of raising water is thus acquired by a new mode, but still resulting from the simple and unerring law of its own pressure. The improvement sought for was thus obtained; a pump was made entirely of metal—to a certain extent, therefore, of imperishable materials—and not liable to the derangement arising from those casual circumstances already alluded to.

As models fail to be convincing, we

10 inch pumps were made by Mr. Charles Robinson, of Pimlico, similar in every respect, with this exception, that one was fitted with a packed bucket, and butterfly valves, the other with the patent elliptical discs; and Mr. Robinson has been kind enough to allow these two pumps to remain at his works for the practical satisfaction of such as may not be convinced by this description.

This size of pump, viz., 10 in. diameter, was chosen because the friction of a 10 in. pump was considered to absorb nearly the whole power of a man. So that the old and new modes would in such case stand fairly contrasted. The result turned out to be so, for the packed pump was very difficult to move, whilst that with the patent discs was worked with the greatest ease; so much so, as to make it evident to a common observer, that a man could do three times as much work with the patent as with the common pump.

This fact naturally induced the patentees to investigate the relative friction of the two pumps. The column of water was 5 feet in each; the diameter 10 inches, so that the weight of water was 170 lbs. nearly. The levers of the pumps were 6 to 1, and it required 49 lbs. at the extremity of the lever of the packed pump to make the upward stroke 49 multiplied by 6 equal to 294. But this was not all; for it required 28 lbs. over a pully to return the bucket, 28 multiplied by 6 equal to 168lbs. Here therefore was exerted a force of 462 lbs., to raise a weight of water not exceeding 170 lbs., leaving 292 lbs. as the value of the friction; whereas, it only required 33 lbs. at the end of the lever equal to 33 multiplied by 6 equal to 198 lbs. to raise the water with the patent pump; and as the piston returned of its own accord, deducting the weight of water, the friction was only 28 lbs.

The patentees expected to find some known data, or acknowledged rules, for determining the friction in pumps generally; but they were disappointed, while nothing could be more conflicting than the opinions of practical men on this subject, some fixing it at $\frac{1}{4}$th or $\frac{1}{2}$, when in fact there is no law to determine the friction à *priori*, depending, as it entirely does, upon the packing of the bucket, and the ease or difficulty with which the valves open and shut. Their experiments have led them to the conclusion, that in any and every packed and valved bucket which delivers faithfully the quantity of water due to its diameter and length of stroke, the power necessary to overcome the friction exceeds that which is requisite to raise the water.

A pump 10 in. diameter, with an 8 in. stroke, should deliver 2 gallons of water per stroke. Amongst the old dicta there is one of Desaguillier's recorded in almost every treatise on the pump, to the effect, that with the best made pump one man, making a full day's work, ought to raise a hogshead of water, 10ft. high, per minute. Now, suppose this hogshead to contain 54 gallons of 10lbs. each, equal to 540 lbs. raised 10 ft. high, equal to 5400 lbs. of water only, exclusive of the friction of the bucket and valves, raised one foot high in one minute; but if the friction is to be 292 parts out of 462, this duty is impossible.

There is no longer any doubt that the friction in packed pumps is a serious quantity, increasing as the circumference and depth of the moveable bucket are increased, and absorbing power, both in the downward or return stroke, as well as in the upward discharging or effective stroke, while the metallic disc piston can be made sufficiently strong for any unlimited diameter of pump, by ribs, or other contrivances, without materially increasing the thickness at the periphery and consequently, the rubbing surfaces. Moreover, the friction will only exist in the upward or discharging stroke, and will never exceed what is due to the weight of the column of water tending to keep the piston against the sides of the barrel, instead of the undefined amount arising from the uncertain packing of the bucket in order to prevent the water slipping, both during the upward and downward stroke.

We have already shown what was the comparative friction of the two pumps at Mr. Robinson's, with a 5 ft. lift of water; and by way of illustrating the preceding observations, an experiment was made with another pump, intended to be 10 in. diameter, but bored rather larger, fitted with a cover and a branch to receive an ascending pipe: the pump-rod, of course, working through a gland and stuffing-box. Pipes of the same diameter were added to the branch, until the height from the level of the water in the well to the point of discharge was 15ft. 4 in. The weight of such a column of water is 550lbs.

The lever in this case was also 6 to 1, and 98lbs hung on the end accomplished the discharging stroke; hence 99 multiplied by 6 is equal to 588—550

weight of water equal to 38lbs. for friction, or about one sixteenth part of the whole, being 10lbs. more than with the 5ft. column, without allowing for the friction of the rod working through the stuffing-box, and also for the trifling addition to the pump's diameter; thus showing that friction does increase with the height of the column. But in a pump on this principle, the increase is confined to a cause which cannot be removed.

The same opportunity was taken advantage of to approximate to what might be considered the *maximum* duty of a man whilst working with a pump of this construction. Two men made 41 strokes in *one* minute, lifting 2·24 gallons, or 22·4 lbs. of water 15ft. 4in. high at each stroke, which is equivalent to 14,107 lbs. raised one foot high in one minute by two men; and half that quantity, viz., 7053·5lbs raised the same height by one man.

The leading recommendations of these pumps consist it their *simplicity*—their *durability*, from being made of materials not of perishable nature, and unlike those of other pumps, improvable by use —and their great increase of *power*, in consequence of the abated friction in the *upward* stroke. So great is this last advantage, that on this account alone pumps of a larger diameter may be substituted for those now in use, and worked by *the same* power; nay, as the friction in the downward stroke is reduced to a minimum, a continued exhibition of the same power, would, by the alternating effect of a crank, work *two* pumps of the same larger diameter. Take, for instance, ships in general, and a ship of 120 guns in particular, the pumping provision for which consists of 4 chain pumps, 7 in. diameter, and 4 hand pumps 6 in. diameter, employing, when at work, from 120 to 140 men: the united areas of these 8 pumps is 267 in.; while four 10 inch pumps upon the patent principle, with a united area of 314 in., could be easily worked by about 16 men, and the same extraordinary proportion would exist in every ship, whether in the navy or in the commercial marine. Nor would this increase of power be the only advantage. One frightful evil in all ships' pumps is, their liability to be choked, by rubbish getting into them. In the case of the ship *Erin go bragh*, from Quebec to Liverpool, as noticed in the morning papers of the 16th and 17th December, 1841:—"The extremity of this vessel was so great that she sunk immediately after the packet ship *Roscius* had been the happy means of saving the captain, crew, and one passenger. She was laden with flour and grain, the latter having *choked the pumps.*" This, unfortunately, is not a solitary instance of loss at sea, arising from the inadequacy and incapacity of the pumping provision, particularly instanced in the liability of the pumps to choke. Now it is a prominent feature of the patent pumps that *they cannot choke.* There are no valves to be so affected; while at every stroke, both the piston and clack clear themselves, and allow any extraneous matter that has got into the barrel to be discharged.

In these collective points of view, these pumps will recommend themselves in all mining and pumping operations where durability and increase of power are desired, and in all manufactories, particularly in those where liquids of a high temperature are to be raised, and sugar works in the colonies where the cleanness of the pump, and its freedom from destruction and choking are considerations.

To navigators, contractors, quarrymen, &c., having much water to get rid of but no great height to deliver it, these pumps would be an enormous saving, since hand pumps, with a short lift, could be made of a large diameter. One man, for instance, might work a 15 in. pump, the lift not being more than 3 or 4 feet.

Description of the Engravings.

Fig. 1. Is a plan of the piston, a section of which is shown by Figs. 3 and 4. A B the major, C D the minor diameter. R is the joint, (by which the pump-rod P is secured) the centre of which is in the true line of the major diameter A B, but neither in the centre of the pump or piston; being removed therefrom more or less as the diameter of the pump, the altitude of the column of water lifted, and other circumstances may require. The whole area of the piston is therefore divided into two unequal areas.

Fig. 2. Is a plan of the lower valves, which is fixed in the barrel by means of the axle O, the eccentricity of which is regulated upon the same principal as that of the joint in the upper valve or piston.

Fig. 3. Shows the relative position of the piston and valve during the upward or effective stroke.

Fig. 4. The same in the or return stroke.—*Mech. Mag.*

LEWIS'S PARALLEL MOTION FOR PUMP WORK.

Plate 1. fig. 5. exhibits a lifting force-pump recently designed by Messrs. Lewis and Co., of Stangate-street, in which they have introduced a novel substitute for the slings and guides heretofore employed for preserving the parallelism of the piston-rod. The novelty of this arrangement consists in the employment of a movable fulcrum, which describes the arc of a circle, while the piston-rod, and the end of the lever or handle to which it is attached, moves up and down in a straight line.

In the illustrative engaving, *a* is the working barrel of a lifting force-pump; *b*, the piston-rod, attached directly to the lever or handle *c d*, at *c*, and furnished with an anti-friction roller, which works in a slot formed in the upper limb of the pump-frame or standard. *e* is the fulcrum of the handle bearing on the fulcrum-rod *f*, which rod works upon a joint affixed to the standard at *g*.

On working the handle *d*, the top of the piston-rod moves up and down perpendicularly in the line *b c*, while the fulcrum *e* describes the arc $e' \ e''$.

By means of this arrangement, the height of the pump is reduced full one-third; and its compactness is still further increased by throwing the piston-rod a little out of the centre, so as to get its stuffing-box, as well as the rising main, both within the space of the pump-barrel. There are only two valves employed in this pump, viz., one in the piston or bucket, and the other at the bottom of the barrel; the latter of which is so ingeniously arranged as to be accessible and removable at pleasure, by merely unscrewing the union joint which connects the pump with its feed-pipe. The action of this pump is remarkably pleasant and easy, and its compact form recommends it as peculiarly adapted for situations where saving of room is an object; while, by the addition of an air-vessel, it is at once converted into an efficient fire pump.

Although shown as applied to a lifting pump, this motion is equally applicable to a forcing pump, by changing the lever from one of the first to one of the second order.—*Mech. Mag.*

DAVIES'S ELLIPTOGRAPH.

Plate 1, figs. 6 and 7. Mechanical draughtsmen have long required the assistance of some simple instrument which should, without any previous complicated adjustment, enable them at once to strike the ellipses, which would correctly represent the perspective of wheels and other circles.

Such an instrument has been designed by Mr. Henry Davies, already well known as the author of several other useful and highly important inventions, and we have much pleasure in adding to the list, that which is represented in the figures named.

This ingenious little instrument consists of an upright stem or axis, which terminates at its lower end in two points *a a*, to give it the required stability in a perfectly vertical position. On the upper part of this axis a compass head *b* revolves, having attached to it, by a joint at *c*, the pen or compass limb *c d*. A square horizontal shaft is jointed into the latter at *e*, and maintained in its position by the parallel rod *f*. Upon the central shaft or axis *a*, there is pivoted a circular steel plate with bevilled edges *g*, which may be set at any required angle to the horizon by the quadrant and set screw *h*. A T-shaped guide *i*, has its longer stem *k* passed through the horizontal shaft, and held by the set screw *m*; the face of the guide *i* is constantly kept in close contact with the edge of the circular disc *g*, by means of a small spring *l*.

A glance at this arrangement will almost suffice to show its operation; suppose, in the first place, that the disc *i* is set perfectly horizontal, and the instrument applied to describe a figure upon paper; on turning round the compass limb and pen *c d*, a transcript of the disc *g*, that is, a circle will be delineated, because the pen has been guided round it in a circular path by the spring *l*. Let the disc *g*, be now set at any angle, say 45°, and the instrument applied to paper and turned round; the pen will again be guided round the disc *g*, but no longer in a circular path; an ellipse will be described, which will be the correct perspective of a wheel or circle viewed at an angle of 45°, and so of circles viewed at any other angles, of a size within the powers of the instrument.

The set screw *m* allows the compass to be set to the size of the circle required; at the same time the guide *i* is always maintained in contact with the disc.

We hope and trust that this convenient and ingenious little instrument will be speedily brought before the public, in a form, and at a price, that will ena-

ble all parties so avail themselves of its important advantages.—*Mech. Mag.*

[The Instrument described in the preceding article is very ingenious and we think likely to be useful. On this account we have placed it amongst our selections : it does not appear however to be *fully* and *perfectly* applicable to the purposes named. A correspondent of the Mechanics Magazine has directed Mr. Davies' attention to certain facts which the writer conceives "indicate a peculiarity in the Instrument" calculated to lessen its usefulness to the extent set forth by the inventor. It is stated that the instrument "will draw an ellipses only when the major axis of that ellipses is in a certain fixed proportion to the diameter of the plate *g*, the proportion depending on the lengths, &c., of the other parts of the instrument.' Mr. Davies promised to examine the subject and answer the objection raised; this we hear he has not yet been enabled to do.]—*Ed. Ind. Rev.*

ROCK HARMONICON.

[Fig 3. Plate 2.] It is pleasing to contemplate the results of intellectual effort when made amidst all the advantages that can be commanded ; but it is especially so to mark its patient and persevering struggles to accomplish some favorite object, when it can only do so alone and unsustained. An instance of this kind is found in the invention before us.—Joseph Richardson a plain unassuming man, with no refinements of education, but possessed of musical talent, while working as a mason in Cumberland, discovered that various and melodious sounds were extracted from the rocks amongst which he was accustomed to pursue his daily labours. It then occurred to him that fragments might be collected, and so judiciously arranged as to form a musical instrument of surpassing sweetness and power. In the year 1827, being employed in building a house at Thornthwaite, and afterwards another at Braithwaite, in the vicinity of Keswick, he began to collect stones for its construction. Those he thus obtained, however, did not answer his purpose, so that at the outset of his undertaking he lost a large portion of time and labor, and suffered disappointment enough to discourage an ordinary mind.

But stimulated by failure to continue his research and toil he found that the stones best calculated for his design were only to be met with amongst the rocks of Skiddaw, and on these he expended his future exertions. Animated now by the hope of success he bore these masses from the mountain on his back to his home at a considerable distance, and there proceeded to reduce them to the shape he considered necessary, and to put to the test the varied tones. This involved an amount of effort not easily estimated ; it was made after many a hard day's work in the mountains ; and often did Richardson deny himself the repose he required, and pass whole nights after his family had retired to rest, pursuing the object on which his heart was set. A considerable share of disappointment must still have been his lot ; the stone which promised well would not answer the purpose if hammerred and chiselled beyond a certain point ; and it may be supposed there were times in which his heart failed him, particularly as a family of eight children were dependant on his daily labor for support, and his task was continued amidst much weariness and trial. At length, however, his skill and perseverance were rewarded, and after more than thirteen years incessant labor, he succeeded in constructing a musical instrument of a very extraordinary character, which is properly called the "Rock Harmonicon." It consists of rough stones, the longest of which is about four feet six inches in length, about three inches in breadth, and about an inch and a half in thickness ; and the shortest of which is about six inches in length, an inch in breadth, and half an inch in thickness : these are placed across a pair of wooden bars, covered with twisted straw, and form the keys, like those of a pianoforte ; the material of them being the mica schist, or as it is commonly called in Cumberland and other places, whinstone. The means employed to extract their sounds are wooden hammers ; small and of lignum vitæ ; larger, and of elm or ash, for the middle notes ; and larger still covered with leather for the bass. Sometimes for the centre keys, hammers are used with two knobs on each, in the form of a crutch handle to strike thirds. Those who are acquainted with the toy Harmonicon, consisting of pieces of glass laid on tapes, to be struck with a cork hammer, will readily form an idea of this singular instrument and the mode in which its sounds are elicited.

The pieces of stone, it should be remarked, are arranged in two rows ; the lower one being tuned in the diatonic

scale, and the upper one containing the flats and sharps. A piece of music may therefore be played in any key, with the greatest facility and fidelity. Three sons of the inventor perform on the instrument pieces of music in three distinct parts; one playing the melody, the next executing a clever working inner part, and the third the fundamental bass. Its power extends to a compass of five octaves and a half, accompanied by all the semitones, tuned from F below the bass stave to C in altissimo—extending, in fact as high as the warble of the lark, down to the deep bass of a funeral bell. The tones produced are equal in quality, and sometimes superior in fulness, to those of a fine piano-forte, under the hand of a skilful player. Difficult chromatic ascents and descents are performed with a truly extraordinary brilliancy and crispness. A professor of music at Liverpool produced, in conjunction with the sons of the inventor, and also alone, some very pleasing and striking effects. M. Costa, addressing the inventor, says, "I have been very much gratified with the performance of your three sons on your very ingenious, instrument, and sincerely wish you may be recompensed for your wonderful discovery." Sir G. Smart also writes, I am happy to offer my testimony in favor of your very clever invention, and think the production of the "Rock Harmonicon" does infinite credit to your perseverance and musical feeling; the tones of the instrument are powerful and beautiful, and I was highly pleased with the performance of your three sons upon it. I sincerely hope your labors will be rewarded as they richly deserve.—*Mag. of Science.*

THE COMPOSING AND DISTRIBUTING MACHINES.

In a former number [IND. REV. *Nov.* 1842,] was given an account of a new mode of composing types, the invention of Messrs. Young and Delcambre. We have now the pleasure of presenting two views—one of a composing, and the other of a distributing machine, both invented by Captain Rosenborg, and certainly superior, in every way, to any previous ones.

The setting-up of the types, which Messrs. Young and Delcambre were able to do at the rate of 6000 an hour, Captain Rosenborg states he can do at the rate of (at least) 10,800; and the distribution of the types, which, under Messrs. Young and Delcambre's arrangements, furnishes occupation for four hands (boys), Captain Rosengorg does by means of *one*, with the aid of machinery.

The mode of working with the machine is as follows:—The chief compositor, who sits at the front of the machine, having his copy before him, performs upon the keys as he reads. By the action of the keys, the corresponding letters are forced out from their respective compartments, and are laid down upon an endless belt or chain, which is constantly passing through the middle of the machine, from the right towards the left. By the motion of this chain, the types, when liberated and placed upon it, are very quickly conveyed into the receiver, where, by the action of a small eccentric, which is revolving at a considerable speed, the types are deposited horizontally, one above the other, in the same order as the keys are performed upon, and are thus formed into lines, the lines being supported by a T-shaped slider, which is made to recede in the same proportion as the types accumulate upon it. As each line is completed (of which the compositor is informed by the dial and warned by the bell), the compositor takes hold of a small winch by his left hand (the figure in the front of the receiver *c*), by turning which the line thus completed is lowered to the bottom of the receiver, while, by moving with his right hand a lever (not seen in the figure), the line is removed from the receiver into the justifying-stick *d*. The time consumed in this operation is less than a second. As soon as the line is removed into the justifying-stick *d*, the assistant-compositor (as shown in fig. 1, at the left end of the machine) detaches, with his left hand, the upper end of that stick (its lower end being moveable upon a fulcrum, as represented at *g*), and having lowered it into a horizontal position, he reads the line (the types standing now in a *vertical* position). Having corrected such faults as may have occurred during the composition, he, by removing a slider, which constitutes the bottom of the justifying-stick, causes the line of types to drop down at once from the stick into a galley, *e*, where he spaces it out.

The principal feature of *novelty* in this machine is the endless chain on which the types are deposited, and by which they are conveyed into the receiver, and the advantages are, the types are carried forward in a straight line

by the endless chain, free from all chance of disturbance, and subject to little or no friction; and that as many letters may be set at once as happen to follow in uninterrupted alphabetical sequence; and, in practice, there is a vast number of words and syllables which the compositor soon learns to dispose of in this way, by one stroke of the keys. For example, *act, add, all, accent, adopt, envy,* are words the letters in which, following in their natural order, may be set up by one pressure of the hand on the keys; the endless chain carries the types forward in the order in which they were deposited upon it, and nothing can occur to disturb that order. So also with such syllables as *ab, eff, dem, opp,* and *ly.* The saving in time from the use of such *accords* (as they are termed) may be thus illustrated. The word *accentuation* contains twelve letters, and would require *twenty-four* movements of the arm of a compositor to set up in the ordinary way; but with Captain Rosenborg's machine it is set up with only three strokes on the keys, as thus, *accentu-at-ion.*

Captain Rosenborg states that he has proved, by actual trials, that his machine is capable of delivering, or clearing out types (supposing them to be composed without regard to order of sequence), to the amount of 400 in a minute, or 24,000 in an hour. Already, a young man, with only a few months' practice, and without a previous knowledge of printing, is able to set-up about three lines of brevier in a minute, each line containing about 60 letters and spaces (this we witnessed), and, assuming that he is able to do so for a continuance, this is equal to about 10,800 in an hour.

[Fig. 1.] *a* are the keys, on which the chief compositor performs, each key answering a particular letter, which is engraved upon a small ivory button, fixed above each key.

b Rack-frames, consisting of a series of vertical rails, by which compartments are formed (one for *a*'s, o[illegible]r *b*'s, and so on), into which the lett[illegible] placed, as they are lifted from the distributing Machine (afterwards described).

c. A receiver, to which all the types are conveyed, and in which the line is formed into words and sentences.

d. A justifying-stick, into which each line, when complete, is removed from the receiver *c*, for the purpose of being read over and justified by an assistant-compositor.

e. A galley, into which the assistant-compositor causes each line to slide down from the justifying-stick, after it has been justified, for the purpose of being spaced out.

h. A counting apparatus, by which the chief compositor is informed when each line is completed. This apparatus consists of a dial-plate and two hands. The plate is divided into inches and eighths of an inch. One of the hands is moveable, and must be placed at starting upon one of the marks, indicating the length of the lines, or width of the page to be composed. The other hand is so connected with the key movements, that it advances a distance equal to the thickness of each type composed, so that when it comes immediately above the other, that gives notice of the line being complete, when it is instantly removed by the compositor, and another begun. There is also a hammer, which strikes a small bell, as a warning to the compositor, a moment or two before each line is completed.

The Distributing Machine.

We now present the view of the distributing-machine, by which a lad can distribute, and replace in the composing-machine, 6000 letters in an hour; but this would offer no hindrance to the general operations of any printing-office adopting the system of composing by machinery, for there might be as many more distributing-machines employed as composing-machines, or the relative speed of the two required; for instance, three of the one for two of the other, five for three, and so on.

This machine is quite detached from the other, and worked independently of it.

[Fig. 2.] *a* is the galley into which a portion of the page or column of type, after working off, is transferred.

b. A travelling-carriage, into which the lines are lowered from the galley *a*, line by line, by means of a slider with a handle on it. From this carriage the different letters are distributed, by the action of the machinery, into separate receptacles provided for them.

c c are keys, with the letters of the alphabet engraved upon them.

d. A box, fixed to the end of the travelling-carriage containing a convolute spring, by the effect of which the line of type in the carriage is continually pressed against the front of the carriage, until the last type in the line is delivered.

e. Grooves, made in an horizontal plate, into which the types are received, when distributed from the carriage *b*.

In these grooves the types are formed into long lines (one sort of letters in each line), by the revolving motion of a small cam or eccentric, working at the end of each groove. (This part of the machinery is necessarilly omitted in the engraving.)

A line of type having been lowered from the galley *a*, into the carriage *b*, the distributor takes hold of the handle on this carriage by his right hand, and moves it towards the right. He then reads the line over, and having, by the forefinger of his left hand, raised the key belonging to the letter, which now is nearest to the front of the carriage, he moves the carriage to the left, until it is stopped by the action of the key he has thus raised. The effect of this is, that the letter corresponding to that key is, through the machinery, forced out from the line, and, falling down through a recess which is made to receive it, is guided into its own groove in the horizontal plate *e*, when by the action of the small eccentric or cam (working at the end of each groove) it is instantly pushed forward, for the purpose of giving room for the next type to fall down.

In this manner the types are distributed and arranged into lines, all the *a*'s in one line, *b*'s in another, and so on, ready for being replaced into their corresponding compartments in the composing-machine. This operation of replacement is performed through the medium of an instrument, denominated "*the feeding-stick*," by which 200 or 300 letters may be lifted at once from the distributing-machine, and transferred to the composing-machine.

Illustrated London News.

UNIVERSAL DRILL STOCK.

The Silver Medal of the Society for the encouragement of arts, manufactures and commerce was presented to Mr. Morgan Evans of Woolwich for an ingenious invention under the above title.

[Plate 3. figs. 1 and 2.] The Stock is constructed so as to elongate itself, by small degrees, during the act of boring, and by that means to force the drill forwards to its work.

For this purpose, the back end of the stock A, fig. 1, from B to C, is made into a screw, and on it is fitted the hollow screwed socket D E, which is furnished with a back centre F, and has holes to receive the lever G; H is the drill, and I a ratchet wheel fixed on the stock. The click J is kept in contact with the wheel as shewn in the front view fig. 2, by a light spring K, which allows the lever L to move back without the drill, but when it is moved forwards the drill turns with it, the click being mounted on the lever; this lever moves freely on the stock under the collet M, and both are kept in place by the pin N. The section lines O P inclose a space only wide enough to introduce the stock and drill, consequently no other screw could be placed within to advance the drill; but with this tool a hollow being made in the part O to receive the centre F, it will determine the exact direction in which a hole shall be bored through the portion P. The drill may be turned by moving the lever L to and fro, while the handle G is held stationary or suffered to rest against the work.

The socket D E being stationary, while the screw BC is constantly urged in one direction, the whole axis becomes elongated, each time that the handle is moved forwards by a quantity, proportionate to the fineness of the screw thread, and the arc described by the handle. The pressure thus produced, which impels the drill to its work, may be increased if necessary, by moving the lever G backwards, or diminished by allowing it a forward motion less than that of the drill.

The rate of the screw BC should, of course, be as nearly as possible proportioned to the work the drill can perform; and should a hole be required deeper than the range of the screw and socket, a second or third drill, of greater length, may be used in succession. As a long axis or stock will guide the drill better than a short one, this tool has the advantage of being always of the greatest length the space OP will admit. In cases where there is no portion of the work to form a back centre, it can be obtained by clamping one to any convenient part of the work.

Transactions of the Society of Arts.

SELF ACTING VICE FOR CARPENTERS.

"I name it a JAY, being anxious that my name should be synonymous with diminution of labour."—*Inventors letter to the Secretary of the Society of Arts.*

The Silver Isis Medal was presented to Mr. De Jay De Beaufort, Perigeaux, France, for the above invention.

[Plate 3, figs. 3 and 4.] The object of this contrivance is to give stability

to a board during the operation of planing its edges; the simple act of thrusting the board into the jaws of the machine, fixing it fast without further adjustment. The vice is mounted on a planing board AA, figs. 3 and 4, of suitable dimensions, which is to be placed on the bench and stopped by the bench hook. It consists of a pair of jaws BB, made of beech or other hard wood, turning on upright iron pivots or screws CC. When the board DD, of which the edge is to be planed, is driven into the jaws, it acts as a wedge, and the force tending to separate them is transmitted backwards by leverage to the tails EE, which are pressed against the sides of the board, and hold it firmly locked.

At the angular junctions of the ends BB, they are partly crossed, a tooth on the one fitting into an opening in the other. By this arrangement, these ends are not completely separated, even when the tails EE are placed in contact; and thus if the board be ever so thin, it will find an abutment.—*Transactions of the Society of Arts.*

NOVEL KIND OF BOAT.

[Plate. 3. Figs 5 and 6.] A singular, and to us a novel exhibition is to be seen during the summer season on many of the ornamental waters in the gardens of Holland. In fact the Dutch have always been celebrated for their mechanical ingenuity, and employ numerous contrivances for their amusement and exercise which are unknown to us, and if these matters are not of essential utility, we must admit that their formation calls into exercise much mechanical knowledge, and adds a greater variety to the healthful amusements of the people. In this manner we view the ordinary contrivances of manual locomotives, velocipedes, paddle wheel boats turned by a winch, and other things of a like character.

The boat which has occasioned this remark we have the more pleasure of introducing, because we have been solicited for an opinion upon the construction of such a one by three or four correspondents at different times.

Plate 3. Fig. 5 shows the boat as it appears when on the water. Fig 6 shews the transverse section. It consists of two small boats shown in Fig 6 at *a a*, fastened together by a platform reaching from the deck of one to the deck of the other. The platform is, however, supported at some distance above the level of the boat, as is seen at Fig 5 for the purpose of getting a longer leverage to the paddles. The platform has a chair and a table placed upon it, the chair having a bent lever on each side. To the upper projecting ends of the bent levers are short rods, which connect them with the treadles. Upon the person in the boat working alternately with his feet upon the treadles, the paddles alternately move into the water, and propel the boat forward; observing that the paddles are made of two peices fastened to each other by hinges, so that drawn through the water in one direction, they occasion little or no impediment, while in the contrary direction by the paddle expanding, it causes that resistance necessary to propel the boat, (as is seen at c c, Fig 6;) both feet being used at once, the boat proceeds with considerable rapidity, and the boatman's hands are always at liberty, either for angling, sketching or any other purpose.—*Mag. of Sci.*

JONES'S WATER KITES FOR THE PREVENTION OF SHIPWRECK ON A LEE SHORE.

[Plate 3. Fig. 7.] The inventor begs respectfully to call the attention of all parties connected with shipping, and the world generally, to the present important discovery. The inventor, who has made it his particular study for upwards of twenty years, to discover by some means or other a plan to prevent ships being driven on a lee shore, feels great pleasure, after a variety of trials and failures, in laying his plans before the public for their inspection; at the same time, the inventor begs to state, that he does not intend to secure to himself the benefit of his discovery by patent right, but is anxious to throw open his invention to all parties who may choose to adopt it, without any remuneration whatever. The prefixed sketches will at once give the public an opportunity of judging of the correctness of his plans. Those who have taken notice of a fish in a strong current, must have observed that a fish checks its speed by the expansion *of its fins* against the *fluid.* It is also well known by every person connected with shipping, that a small piece of wood of an angular form is used on board of a ship, for the purpose of giving the rate at which the ship is sailing (see No. 4.) this is called the ship's log. This angular piece of wood, and line attached, is

thrown into the sea; the bottom part of the wood being made much heavier than the top causes the wood to sink perpendicularly in the water with a rope fastened at each corner, which causes the flat part of the log to face the ship; by this means the log, having a body of fluid against it, remains stationary when the ship is going at the rate of ten knots an hour. It is also well known, that unless the small wooden peg which is placed in the top corner of the log comes out by a sudden jerk of the line, this small piece of wood will require two or three men to pull it towards the ship. The objects 1 2 are upon the same principle of the log, only upon an *enlarged scale*, or I might say upon the principle of a boy's kite in the water reversed; instead of pulling against air, it is pulling against an *immense weight of fluid;* there is this difference, the boy's kite is made of paper, and the water kite is made of *strong timber*, with *strong ropes* attached to the sides of the vessel. The water kites should be made heavy at the bottom and light at the top, so as to keep perpendicular in the water; No. 2 is supposed to be the tail of the kite, 10 feet long, with a buoy made of cork, so as to swim upon the surface of the water, and to cause the water kites to rise and fall with the motion of the waves. A small rope (No. 3) is employed to *haul* the water kites towards the ship *horizontally:* the ropes from the sides of the ship to the water kite should be from 100 to 150 yards long, so as to give as much play as possible; the size and strength of the water kites, also the ropes, must be regulated according to the size of the vessel. The opinion of the inventor is, that the speed of a steam-ship of 400-horse-power, with her engines at full work, would be immediately stopped upon the same principle; in fact it is impossible to calculate the immense weight of fluid the ship would have to pull against.

There is another important advantage to be derived from the use of these water kites, when vessels are off the land in foggy or hazy weather; by using them the ship would remain stationary, although in deep water, till the weather became clear. A case in point: the *Forfarshire* steam vessel, trading between Hull and Dundee, ran on the rocks off the Fern Islands, and became a complete wreck, during a very foggy night: this accident, and many others, might have been prevented, had the vessel been provided with the water kites, and *use been made of them when the fog first came on.* How much safer would it be for captains of ships, in foggy weather, when off the land, to lose a few hours rather than run the risk of so many lives, as well as property!—*Mech. Mag.*

J. JONES.

NEW MODE OF RAISING WATER.

[Plate 3, fig. 8.] The sheet marked B, represents my improvements in pump work for mines, wells, and other places, exhibiting a vertical section thereof, through a series of lifts, for the purpose of raising water or other liquids a distance of seventy-five feet, or thereabouts. In the construction of this apparatus, I take a length of tubing, as at A, to the extent of say twenty-five feet (but more or less, as occasion may require). Upon the top of this tubing I place a box, B, of dimensions suitable to the quantity of water, or other liquid, to be delivered at each stroke, and the bore of the water tubing must be suitable to the dimensions of the box. This box, B, is fitted with three valves, C, D, and E; is made of a floating substance, and has a rod attached to it, so that, on the water or other liquid rising in the water box, B, it may become elevated thereby, and close the mitred openings, so as to prevent the water or other liquid, rising in the air tube, F. G is a box fixed round the delivery valve, D., and, being always full of water, keeps it perfectly air-tight. H is the reservoir for water, affixed round or under the box, B, and is of greater capacity, for the purpose of receiving the water delivered by the box, B, at each stroke. From the reservoir, H, another length of water tubing, I, similar to the water tubing, A, ascends to the second box, K, which is fitted up in all respects similar to the box, B. The air tube, F, passes through or round the reservoir, and round the water box, into a second air-tube, L, ascending from the water box, K. A third length of water tubing, M, ascends from the reservoir last mentioned, and has at its head a water box, N, fitted up in all respects similar to the boxes before described, with this exception—namely, that instead of having a reservoir, a spout, O, is attached for carrying and delivering the water in the direction required. The air tube, L, is of larger bore than the previous tube, and rises till it meets with the air cylinder, Q. A small branch pipe, R, form, the box, N, forms a junction with this air tube,

L, below the cylinder, Q; so that on the elevation of the piston, S, in the cylinder, Q, caused by the vacuum created under the piston, T, in the steam cylinder, U, and also by the pressure of the atmosphere, in excess of the pressure required to support the column of water, or other liquid, in one lift, the air in all the boxes is thereby acted upon, and removed into the air tubes and cylinder; and water, or other liquid, takes the place of the air removed from the boxes. The theory of the action of this portion of the stroke of the engine, is founded upon the well known law of the pressure of fluids. Thus, assuming the pressure of the atmosphere to be 15lbs. per square inch, and that this pressure will support in *vacuo* a column of water of nearly thirty-four feet in height, it is evident that if the height of the column be fixed at twenty-five feet or thereabouts, there will be, on the head thereof, a surplus pressure of about 4½ lbs. on the square inch, which is sufficient, taking all the lifts together, to overcome the friction of this portion of the stroke of the engine. The remaining portion of the stroke—that is, the downward stroke of the piston, S, or the stroke for delivering the water—is produced by admitting steam, at or about the atmospheric pressure, into the cylinder, U, under the piston, T, by the steam port, V, which causing the piston, S, to descend in the air cylinder, Q, restores to the surface of the water, in each of the water boxes, a pressure equal to that of the atmosphere; the effect of which is, owing to the tendency of the water to gravitate, that the water is ejected at the delivery valves before mentioned. A pipe, W, is connected from the waste port, X, of steam cylinder, U, to the top of cylinder, Q, through which pipe, on reversing the valves Y and Z, the steam flows, and is acted upon, and condensed by, a jet of water from the rose, *a*; and on the piston, S, attaining the summit of its stroke, ejected at the port, *b*, into the tube fitted with a water-tight valve, *c*. The cylinders are connected at their tops by a pipe, *d*, which keeps on the surface of each piston an equal amount of pressure, the cubical contents of each of the cylinders being, at least, equal to the cubical contents of the whole of the water boxes employed. The valve *c*, at the neck of the waste steam pipe, W, is for the purpose of preventing the water from flowing down it, on the elevation of the piston, S. The pistons are fitted with rods attached to a working beam, having parallel motions at either end, from which beam the valves, Y and Z, may be worked by means of tapitts. The steam port, V, is connected with a steam boiler, proposed to be worked at high pressure, so that the steam may be wire drawn, and enter the cylinder at a low degree of elasticity. In starting this apparatus, it is first necessary, by means of an air pump, which can be applied to each of the water boxes in succession, to exhaust the air from all the water boxes that the water may rise therein, the admission of the steam in cylinder, U, under the piston T, causing the descent of the water in the boxes, and thereby obtaining the first portion of the stroke, when its condensation, producing a vacuum in the cylinder, U, the air returns from the boxes, in consequence of the surplus atmospheric pressure, and performs the remaining portion of the stroke. The engine might also be started by filling the reservoirs and valve boxes with water, and employing steam at a somewhat higher pressure, till the whole of the water tubing was filled with water. In the invention of this apparatus, I do not limit myself to any size or form of tube, either longitudinally or transversely, nor to any particular dimensions of forms of valves, boxes, cylinders, rods, or others parts; nor do I confine myself to the precise figures or shapes, as shown in the annexed drawings, as the same may be varied as found requisite; nor to the use of any particular metal, or other material, for the construction thereof respectively; nor to any certain number of lifts between the well and the cylinders, nor to the exclusive use of steam. I do not claim, as my invention, the raising of water without its entering the working barrels of pumps, neither do I claim the invention of raising water by means of a series of lifts, by means of air-light tanks or cisterns. But I do claim the principle of the general arrangement and adaptation of the machinery described, and the peculiar application of the sources of its action, as set forth in the description of sheet B, and the above statement thereof; and as the general arrangement, or some portion of it above described, without the steam cylinder and its appurtenances, under some circumstances, may be worked with advantage by water, manual, or other power, I also claim for my invention, or any portion or portions thereof, the use or application of such power, or as many powers, as can be so applied.

Mining Journal.

DOOR FASTENER.

Invented by Mr. C. T. Coathupe, Wraxall (near Bristol)

Plate 3. Fig. 9—It consists of a steel wedge and screw. The figure is quarter size, and represents it in action. A B is the wedge inserted close under a door C; the end B is then raised by the screw D, which will press the door forcibly upwards against its frame on its hinges, and the screw point will enter the floor enough to prevent its being slidden back. Thus fastened, all pressure from without to open the door must fail, as it can only force the door further up the already tightened inclined plane.
Transactions of the Society of Arts.

LATHE FOR TURNING THE ELIZABETHIAN TWIST.

Plate 4, fig. 2. A B C are three poppits, with two rods D and E passing through them; chucks screw on to them at F F, to hold the work G, and which must be turned true before being put on. H is a lever bent at a right angle so that when carried down by the treadle it forces the rod D forward, it being turned round at the same time by the line runing on the pully I. As the treadle rises the weight hanging on the bent lever K, forces the rod E, back again, consequently the tool on the rest at L, must cut a spiral as the work travesses backwards and forwards. The lever H, is wood, but has a screw of metal 18 inches in length; a nut to which the string to the treadle is attached being turned nearer or further from the fulcrum shortens or lengthens the lever as desired by the operation, thereby increasing or diminishing the size or length of the twist; it scarcely needs the observation that the number of turns the work takes each time of the depression of the treadle depends on the size of the pully I; therefore, the regulation of the turns of the twist and the size of the cut are governed by these two.

If a double twist is required to be turned, it is easily done by cutting another thread between each former cut, and the cut may be reversed, so as to cut either a right or left screw, by putting on the line or pully I backwards or forwards; it makes this difference, that making the turns towards you, the cut is as the foot descends and gives a right handed screw; making the turn from you, the cut is as the foot rises, and it gives a left-handed screw. The string N M, is attached to a slide at N, to adjust itself to the distance of the nut at H; for this purpose a lever treadle is better than the gate, unless the centre bar is removed, with this the open twist is easily managed; but this I expect requires no explanation from me, as any experienced turner in possession of this apparatus will be at no loss how to manage it.

Mag. of Science.

READMAN'S PATENT IMPROVEMENTS IN BAROMETERS.

[Specification enrolled September 7, 1842. Plate 4 Fig 3 : 2-3 and 5.]

The improvements which are the subject of the present notice are founded on the following general considerations. In the common barometer, the pressure of the column of mercury, added to the atmospheric pressure on the surface of the mercury in the cistern, being equal to the atmospheric pressure on the exterior bottom of the cistern, it follows, that if we place the cistern, with its contents, upon the top of a spring, or other exactly adjusted balance, the depression caused in the balance will be no more than what is due to the weight at the moment of the cistern and its contents, independently of the barometric column—the weight of that column being counterbalanced by the atmospheric pressure on the exterior bottom of the cistern. But as the mercury in the cistern is the source whence the barometric column is derived, and as the quantity in the cistern is increased or diminished according to the height of that column, it follows also, that as the barometric column is caused to rise or fall by variations in the weight of the atmosphere so the weight, of the cistern will be proportionally increased or diminished, and the spring, or other balance on which it presses, be to the same extent raised or lowered. It is further obvious, that if we ascertain how many inches, or parts of inches, are included within the extreme range of the barometric column, and what the weight of so many inches or parts of inches of mercury is, and to what extent the addition of such weight to the cistern will cause the spring or other balance to be depressed, we may from these data construct an index, which, being attached to the balance, will show on inspection the smallest

changes in the height of the barometric column.

This, therefore, is what Mr. Readman, the present patentee, has done; and, by so doing, obviated three acknowledged defects in the barometers commonly constructed, namely, first, the difficulty of ascertaining the proper allowance to be made for the expansive effect of changes of temperature on the barometric column; secondly, the smallness of the range; and, thirdly, the disturbing influence of alterations in the level of the mercury in the cistern.

Fig. 2 shows the manner of constructing a wheel barometer on this principle.

a b c is a cylinder containing mercury; *d e*, a second cylinder, which floats in the mercury within the other, forming the cistern of the barometer, (the mercury in the cylinder *a b c* serving the same purpose as the spring balance before spoken of;) *a* 2, the barometrical tube; *f*, a brass rim, which runs round the top of the cistern *d e*, and to the bottom of which is soldered the projecting circular plate, *g*; *h i* are two uprights, which are screwed into the plate *g*, and are united at top by a cross piece *k*; *l* is a toothed rack which rises from the centre of the cross-piece, *k*; *m*, a toothed wheel, into which the rack *l* works, and to the axis of which wheel is attached the pointer of a properly graduated dial-plate; *n o*, anti-friction wheels, attached on each side to the projecting rim *g*, and which work in grooves in the frame-pieces, *r s*; *p*, a third anti-friction wheel, against which the rack *l* works as it rises and falls. To keep the rack in a direct line with the centre of the cistern, the tube of the barometric column is bent aside a little at *t*, as shown in the engraving. The mode of action is as follows:—As the quantity of mercury in the cistern *d e* is increased or diminished, the cistern rises or falls in the mercury contained in the outer cylinder *a b c*, and through the medium of the uprights *h i*, and rack and wheel *l m*, the exact amount of the rise or fall is communicated to, and indicated by, the pointer of the index. When it is desired to render this instrument portable, the plate *g* is brought close down upon the cylinder *a b c*, so as to serve as a lid to it. The instrument is then held in an inclined position, till the tube *a* 2 is completely filled; the tube *a* 2 is next unloosed from its fastenings, and pressed against the bottom of the cistern, which is protected by a piece of soft leather, after which the stopper *u* is slid down the tube *a* 2, and closes the mouth of the cistern.

By applying a fixed scale to the side of the tube *a* 2 of an instrument of the preceding description, very minute changes in atmospheric pressure might be rendered perceptible; for, besides the actual lengthening or shortening of the barometrical column by changes of pressure, such a scale would indicate the rise and fall of the cistern, the amount of which could be added to the range of the column. Thus, suppose the column to fall from 31 to 28 inches; if the cistern were fixed, the scale would indicate a fall of only 3 inches; but if the cistern is made to float in mercury, in the manner before described, so that it rises and falls in proportion to any increase or diminution in the quantity of mercury in it; or if it is placed on a spring or other balance, which is affected in the same way, then the barometric column will have a farther fall, proportionate to the depression caused by the addition of the three inches of mercury to the cistern.

The patentee gives the following directions for graduating the instrument:—

"Assuming the extreme range of the barometric column to be 3 inches, the weight of these 3 inches should be ascertained, and an equivalent amount of mercury taken from the cistern, marking exactly the position of the index pointer, both before and after the operation. A quantity equivalent to the excess of the column, above 28 inches is then to be deducted, and the remainder returned. For instance, supposing the weight of the 3 inches of the barometric column is 3 oz., and that the cistern stands at 28½ inches, you should then, (proceeding as above directed,) return only 2½ oz. instead of 3 oz., the ½ oz. being deducted to allow for the ½ inch which the barometric column exceeds 28 inches, and upon the flowing of which into the cistern the index pointer will be carried to its original position. The space included between the two points is to be divided in the usual manner

Mr. Readman describes, also, a very ingenious arrangement, by which a barometer on his improved plan may have a balance on the steelyard principle applied to it. A representation of this arrangement is given in fig. 3.

a b is a metal cylinder fixed to the bottom of the frame or case which

holds the cistern $c\ d$, (the diameter of the cylinder being a little larger than that of the cistern,) and which partly incloses that cistern. Round the top of the cistern there is a metal rim, which projects a little beyond the sides of the cylinder $d\ b$, and is bevelled on part of its under surface, to keep the cistern exactly in the middle of the cylinder $a\ b$; $e\ f$ is a lever or steelyard, with a sliding weight, g, resting on a fulcrum at h; the short arm of the lever has a termination of a crescent form, (as shown in the separate view given in fig. 5,) the two branches or horns of which have conical points, which enter into corresponding holes in the rim of the cistern. To ascertain the height of the column, the lever is brought to a horizontal position, by causing the short arm to press upwards against the gauge-point l, simultaneously with which the crescent end of the same arm, catching hold of the rim of the cistern, raises it also, and, by means of the conical points inserted in the holes of the rim, keeps the cistern always at the same distance from the fulcrum. The sliding weight g is then moved towards the fulcrum, and the height of the column thus ascertained. The adoption of this plan will not interfere with the ordinary scale, which may be still retained in combination with it. When the steel-yard lever is not required to be in use, it may be placed out of the way, in the vertical recess $i\ k$, to which there is an opening in the side of the framework."

To *register* the indications of his improved barometer, Mr. Readman judiciously avails himself of the newly-discovered art of photography :—

" I place at the back of the cistern, or spring balance, a circular plate of metal, covered in front with photogenic paper, of the same size as the dial-plate, and make the centres of the two plates to coincide exactly. Betwixt the circumference of the dial-plate and the graduated circle on the face of it there is a margin or border left, of about an inch and a half in breadth, and across this margin I make a narrow slit, directly over or under the centre of the plate. Behind the dial and before this slit, I place a slip of metal, which is attached to the cistern balance, or spring balance, the bottom of which, when the mercurial column is at its highest point, is on a level with the upper end of the slit. Now, as the rising or falling of the cistern or spring balance increases or diminishes the length of the line of light admitted on to the photogenic paper, then, by causing the registering plate to revolve (by a weight, or by any other convenient means,) a circular border is formed on the photogenic paper, the outer edge of which represents exactly the fluctuations in the atmospheric pressure. But, as the preceding method answers only for the daytime, I adopt the following plan when it is desired to continue the registration during both night and day. To the cistern or spring balance I affix a pencil, the point of which is made, by means of a spring, to press lightly on a surface of common paper stretched over the registering plate, so that on the plate being caused to revolve, (by a weight, or otherwise,) the pencil registers, by corresponding lines on the paper, the rise and fall of the barometric column."—*Mech. Mag.*

WRITING FRAME FOR THE BLIND

The silver Isis medal was presented to Mr. William Stidolph for the frame described in this article for guiding the hand of blind or tremulous writers.

[Plate 4. Fig. 4.] A frame $a\ a$, fig 1, has its inner surface b sunk nearly a quarter of an inch and covered with velvet, on which the writing-paper $c\ c$ is laid, and one edge of it passed under a groove shewn by the dotted line, $d\ d$, the other edge being held down by the rule $e\ g$, the end e fitting a mortice, and g dropping into a notch; for holding narrower paper another mortice h and notch k are provided. In order to determine the distance of the written lines, two racks $l\ l$ are let into the sides of the frame, which cause the hand, when placed as shewn by dotted lines, to move strictly parallel. On the first frame a, a, is laid another frame composed of two bars m, m, and n, n, the former for supporting the wrist, and the latter being hollowed for the little finger to slide on, united by the wires o, o. On the bar m is made the dove-tailed groove $p\ p$ to receive the wrist-holder q, which moves quite freely along it, being furnished with two rollers, as shewn in the separate views figs 6 and 7; the two cheeks $r\ r$ keep the bar m in place, whilst the bar n drops in between the sides of the frame a, and lies on the paper, it being made thinner over the rule $e\ g$; thus the end shake of the two bars being prevented, the frame $m\ n\ o\ o$ cannot tilt, but will keep its parallelism when slidden down the frame a.

Fig. 8 shews one of the teeth p which

are fixed under the bar *m* to catch in the racks *l l*; the frame *m n* being moved one tooth lower for each succeeding line. Two wires *s s* fixed in the bar *n* hold an elastic string *t* for the pencil to rest against (which may be used at the option of the writer), the elasticity allowing for the long letters.

Fig 9 is a side view, and shews the hollow on the bar *n* in which the little finger slides: it is made so smooth that the little finger slides on it as easily as on the paper; and the wristholder *q*, covered with velvet above, moves so freely in the groove *p* that the hand does not feel any resistance; this support and the sliding of the little finger ensures straight writing, and equal distances between the lines are obtained by means of the rack.

Trans. Soc. of Arts.

EPITOME OF NEWS FOR DECEMBER AND JANUARY.

Thursday, December 15th.—Lord Ellenborough had arrived at Loodiana where he had an interview with Dost Mahomed. We are rejoiced to find that his Lordship had dispensed with the appearance of the Ex Ameer at the tournament of Ferozepore where our triumph over the Affghans was to be celebrated with the most extraordinary pomp. The Dost had been permitted to proceed from Loodiana through Lahore, with a small escort of our troops.

— Mr. Montague, of the Parental Academy, delivered the first of a series of lectures on political economy to forty members of the Mechanic's Institution on Tuesday last.

— Intelligence received from Canton to the 25th October. Capt. Balfour, of the Madras army, appointed Consul General; has made himself master of the language and character of the people to an extraordinary degree since he was sent to China. The papers also state that the Reverend Charles Gutzlaff is to be made one of the Consuls!

— The *Penang Gazette* states, that Coal has been discovered in the Lancava Islands in the Straits.

— By the last accounts from General Wild's brigade, dated the 2d instant, there were 900 sick; and scarcely 700 men fit for duty.

— At the monthly meeting of the Agricultural Society held yesterday, sixteen gentlemen being present, it was resolved that the proxies of absent members should not be received for the Secretaryship.

Tuesday, December 20th.—The Governor General has reached the Army of Reserve. The troops were drawn out to receive him and formed a line two miles in length. It was said that the line would have extended to five miles, and when the returning troops had arrived, would be elongated to *ten* miles. The 15th was the day fixed for Lord Ellenborough "to receive the heroes," Major Broadfoot to lead the procession.

Thursday, December 29th.—Letters received from Ferozepore, dated the 17th of December, on which day the troops, which formed the garrison of Jellalabad, crossed the Sutlege and were received in the most flattering manner by the Governor General.

—The *Hurkaru* states, that the Ameers of Scinde have positively refused to sign the treaty, and are preparing themselves for a resort to arms.

—The whole of General Pollock's force having crossed the Sutlege, the 26th Native Infantry were, by order of the Governor General, formed into a hollow square, when his Lordship informed them that for their gallant conduct in the field, he would make them a Light Infantry corps.

Monday, January 2nd, 1843.—The *Englishman* has with the beginning of the present year, put on a new dress, and appears in new type. The *Daily Star* has been enlarged and is now published in two sheets. The *Madras Athenæum* and the *Bombay Courier*, both announce an augmentation of size, and thus we have an unequivocal token of the increase of the reading public in India.

Tuesday, January 3rd.—General Nott's Brigade marched across the Bridge of the Sutledge on the 23d of December, and was cordially welcomed to the British territories by the Governor General.

—At the Opium Sale held yesterday, 4965 chests of Opium were disposed of at a very high rate; the Behar averaged 1456 Rs. the Benares 1283 Rs. the chest. The result of the sale was nearly seventy lakhs of Rupees. The clear profit to Government of this first sale of the year was *half a million sterling.*

Wednesday, January 4th.—The two bridges across the Sutlege have been swept away by a sudden rise in the river. It was a fortunate circumstance that the last Brigade of the army of Affghanistan had passed over before the bridges disappeared.

—The *Enterprize* Steamer announced from Madras, with Dwarkenath Tagore, Mr. Go. Thompson, and twelve of their fellow passengers on board.

Thursday, January 5th.—Mr. Montague continues his lectures on Political Economy at the Mechanics' Institute. In his last lecture, he dissected the Zemindarry system, and demonstrated that it was vitally inimical to the interests of the Agricultural classes.

Friday, January 6th.—The unfortunate Shahpoor, whom General Pollock left on the throne of Cabul, is now a fugitive at Peshawur. Mahomed Akbar is supreme at Cabul. Zeman Khan is Governor of Jellalabad, Shumsooddeen of Ghuzni, and Sultan Jan of Candahar. Every thing is reverting to the old state of things as it was before we entered the country.

— We are happy to learn that the Parental Academy has got rid of all its debts, and will begin the year, as the *Hurkaru* tells us, with the *sure prospect* of improvement.

Saturday, January 7th.—The relief of the Army, which has been looked for with much anxiety, is at length made public.

Monday, January 9th.—The last number of the *Christian Advocate* states, that a scientific Mission, consisting of more than thirty individuals, eminent in different branches of science and literature, was about to be despatched to India by the King of Prussia. The celebrated Sungskrit scholar, Professor Bopp, is at the head of the mission, the members of which are to remain five years in India.

Thursday, January 12th.—The great question of the Secretaryship of the Agricultural Society was decided yesterday. Mr. Hume was appointed Honorary Secretary.

Friday, January 13th.—The Prince Royal of the Punjab, Pertab Singh, the eldest son of Rajah Shere Singh, arrived in the Governor General's Camp on the 30th of last month, accompanied by Rajah Dhyan Singh, General Court, and a very splendid escort of infantry, cavalry and six guns, on a visit to the Governor General. The young prince is about ten years old. On the 1st of January there was an official meeting between the Seikh Deputation and Lord Ellenborough, after which the whole party proceeded to the field and viewed the rehearsal of the battle of Salamanca, by the whole army of General Nott, and General Pollock, and the Army of Reserve, consisting of 25 Regiments of Infantry, 12 Regiments of Cavalry and 108 pieces of ordnance. It was a grand and gallant sight, and it is said—very naturally—that Lord Ellenborough was very much gratified.

—The *Hindoostan* Steamer, which starts to-morrow morning, takes home Dr. Thomas Smith, late first member of the Medical Board, a man whose genuine benevolence of character, and unostentatious liberality, dispensed on the true Christian principle of not allowing the left hand to know what the right, hand does, has endeared him to all who were acquainted with him.

Tuesday, January 17th,—Intelligence has been received from China to the 6th instant. Sir Hugh Gough had arrived at Hong Kong and intended to embark, in a short time for Calcutta. Previous to his departure from Chusan, the Plenipotentiary and the Naval and Military Commanders-in-Chief had visited the Chinese authorities at Ningpo where they were received with much courtesy and even cordiality. It was remarked with surprize how rapidly the city of Ningpo had recovered its prosperity. A twelvemonth ago it was deserted. On the visit now paid it was found that the houses which had been burnt for firewood had been re-built, the bridge of boats re-established, the shops stored with every variety of the richest merchandize, and the city itself filled with a busy population. There appears an elasticity in the Chinese character, which no other nation in Asia exhibits.—The *Herculaneum* transport had been wrecked on the island of Formosa, but the crew was treated with great kindess by the public authorites.

Thursday, January 26th.—The *Delhi Gazette*, received last evening, gives the result of the Court Martial on Captains Anderson, Boyd, Eyre and Troup, they were charged with having abandoned the English forces on the march from Cabul and sought the protectionof Akbar Khan. They have been honourably acquitted, and the Commander-in-Chief has fully concurred in the acquittal.

—On the 4th of January, the Hon. Mr. Robertson resigned the administration of the Agra Presidency to Lord Ellenborough, and afterwards received with much grace and cordiality a deputation from the uncovenanted service.

—The accident which happened to Mr. Grant the other night, by the submersion of his carriage and horses in the Durrumtollah tank, is likely to be the occasion of a public benefit. The Chief Magistrate is about to apply to Government for the means of railing in the tank. It is doubtful whether a similar accident to a common hackney

coach would have produced the same anxiety ; and it is advantageous, therefore, for a Master in Equity occasionally to run the risk of being drowned.

Saturday, January 28th.—The honourable acquittal of Col. Palmer, for the surrender of Guzni is at length officially published. The Court acquit him of all and every part of the charges preferred against him, and the Commander-in-Chief " heartily concurs in the justice of this honourable verdict." The circumstances, adds his Excellency, under which Col. Palmer surrendered Ghuzni, were such as he could neither control, alter, or alleviate.

Jan. 30th.—Messrs. Currie and Co., the proprietors of Jack Hinton and the other popular works of Mr. Lever, have issued an address to all land pirates in the British Colonies, announcing to the Newspaper proprietors in the East and elsewhere, who are in the habit of reprinting those works, that it is their intention to prosecute them for infringing the Copyright. The bibliopolists will find, as the *Hurkaru* justly says, that they have been cutting their own throats. These republications are the cheapest and best means of advertising these books, and for one instance in which they arrest the sale of the work, they promote it in ten.

—At the meeting held at the Town Hall, on Saturday last, it was resolved to present an address to Mr. Greenlaw, the indefatigable promoter of steam communication between Calcutta and England ; as well as a piece of plate with a suitable inscription, and if the funds allowed of it, to procure a statue or a portrait of him. Mr. George Thompson addressed the assembly in a speech, such as was never before heard within the walls of the Town Hall.

Jan. 31st.—The Proprietorship of the *India Review* and Editorship of the *Medical Journal*, so long in the hands of Dr. Corbyn, have been transferred, the first to Mr. Grant the artist, and the second to Dr. Eveleigh.—*Gleanings from the " Friend of India."*

MEAN TEMPERATURE AT DINAPORE FOR THE MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1842.

No observations made during the night, as a self registering Thermometer was not available.

Mean Temperature for October, 1842.

Sun Rise.	9 A. M.	Noon.	3 P. M.	Sun Set.	9 P. M.	Minimum.	Medium.	Maximum.	Mean of 6 Observations.	Mean daily range of Temperature.
76·0	79·4	82·2	83·0	80·9	78·3	76·0	79·0	0·38	79·9	7·4

Hygrometer.

Temperature.		Dew point.	Difference.	
9 A. M.	71·6	68·0	3.6	Prevailing winds E. and N. W.
3 P. M.	82·7	74·6	8·1	
Mean of all	77·1	71·3	5·8	

RAIN fell on the 6th, 7th, 10th, 13th, 16th and 29th, generally accompanied with strong East winds.

A thunder storm on the 13th. Excepting the days on which Rain fell the weather was generally clear and fine.

Dew mostly every night.

Mean Temperature for November, 1842.

Sun Rise.	9 A. M.	Noon.	3 P. M.	Sun Set.	9 P. M.	Minimum.	Medium.	Maximum.	Mean of 6 Observations.	Mean daily range of Temperature.
61·8	69·7	75·5	79·1	76·0	69·2	61·8	69·7	79·1	71·8	12·5

Hygrometer.

Temperature.		Dew point.	Difference.	
9 A. M.	70·7	65·2	5·5	Prevailing Winds N. W. and N. E.
3 P. M.	78·7	66·1	12·6	
Mean of all	74·7	65·6	9·1	

Weather clear and fine.
Dew at night. No rain.

Mean Temperature for December, 1842.

Sun Rise.	9 A. M.	Noon.	3 P. M.	Sun Set.	9 P. M.	Minimum.	Medium.	Maximum.	Mean of 6 Observations.	Mean daily range of Temperature.
56·8	62·9	68·9	71·1	69·8	63·9	56·8	63·9	71·1	65·5	14·3

Hygrometer.

Temperature.		Dew Point.	Difference.	
9 A. M.	65·2	61·2	4	Prevailing Winds N. W. and N. E.
3 P. M.	71·1	63·8	7·3	
Mean of all	68·1	62·8	5·6	

Rain fell on the 22nd, 23rd and 24th.
Dew and Fog at night. Weather clear and fine excepting on the Rainy days.
Mean Temperature for the Quarter 72·4.

METEOROLOGICAL TABLE, KEPT AT DINAPORE, JANUARY, 1843.

Days.	Moon's Changes.	Self registering Thermometer. Minimum.	Thermometer, in the shade. Sunrise.	9 A. M.	Noon.	3 P. M.	Sunset.	9 P. M.	Daily range of Thermometer.	Difference between int. and dry bulb Thermometer. 9 A. M.	3 P. M.	Winds. A. M.	P. M.	Remarks. Night.	A. M.
1	●	53	58	64·8	69·5	70·5	69·8	...	17·5	3·5	5	Light N.	Light N.	Fog & dew.	Light clouds.
2		57	60·2	66	69·7	72·4	70	63	15·4	3	7·5	Strong W.N.W.	W.N.W.	Dew.	Day clear and fine
3		50·5	53·5	61·2	67·3	69·5	67.2	65	19	4	6 5	W.N.W.	W.N.W.	Dew.	Day clear and fine
4		59	60·8	62·8	65	68·8	67	63·4	9·8	3·5	4·5	Light W.N.W.	Light W.N.W.		Dark cloudy lt. rain
5		57	53·8	61.3	...	67	65·5	56·7	10·3	5	6·5	W.N.W.	W.N.W.		Dark and cloudy.
6		44	47	56	61·9	64	62·7	...	20	5	7·5	N.W.	N.W.	Dew.	Day clear and fin
7		41	45·7	55·4	61·4	63·9	62·5	54·	22·9	4	6	Light N.W.	Light N.W.	Dew & fog.	Day clear and fi
8		41·5	46·5	56·4	61	64·4	62	56·2	22·9	4·5	6·5	N.	N.	Dew & fog.	Day cloudy.
9	☽	45	51	59·3	64	66·6	65·5	63·3	21·6	2·5	7·5	E.	N.E.	Dew.	Day cloudy.
10		51·5	57	61·8	66·4	68	66.4	62	16·5	2·5	5·5	Light W.N W.	Light W.N.W.	Dew.	Day cloudy.
11		49	52·1	59	64·6	66·6	65·5	59·2	17·6	3·5	5·5	Light W.N.W.	Light W.N.W.	Dew & fog.	Day clear and fin
12		47	51·8	60·8	64·8	68·1	66	...	21·1	4	9	W.N.W.	W.N.W.	Dew.	Day clear and fin
13		48	52·5	61·4	66·1	69·4	67·2	...	21·4	4	6	E.N.E.	E.N.E.	Dew & fog.	Day clear and fi
14		51	53·3	60·1	66·2	67·7	65·5	59·6	16·7	3.5	8·5	W.N.W.	W.N.W	Dew.	Day clear and fi
15		46	50	56	63·5	65·6	65	60	19·6	5	10	W.N.W.	W.N.W.	Dew.	Day clear and fi
16	○	49·5	55·5	60·2	64·5	64·6	61·9	...	15·1	4·5	5·5	N.E. airs.	N. E. airs.	Dew.	Day dark and cl
17		59·5	61	62	63	63	61	61	3·5	3·5	4	E.S.E.	E.S.E.	Dew.	Day dark & clou
18		58	59·3	62·3	66.3	65	63·5	...	8·3	1·5	2	E.S.E.	E.S.E.	Night wet.	Dark and cloudy
19		61·5	62·6	65	67	67·4	66·8	63·6	5·9	2	2	E. airs.	E. airs.		Day dark and cl
20		55·5	58·5	61	65·7	68·8	67·1	...	13·3	2	4	W.N.W. light.	Light W.N.W.	Dew.	Dense fog till 10 A.
21		48·5	52	57·7	64·5	66	65	59·2	17·5	4	8·5	W.N.W.	W.N.W.	Dew.	Day clear and fi
22		47·8	50·5	58·2	64·7	67	...	...	19·5	3·5	7	W.N.W.	W.N.W.	Dew.	Day do.
23	☾	49·5	52·5	58·9	65·2	67·3	67	58·9	17·8	4	6·5	Light W.	N.W.	Dew.	Day do.
24		50	51·9	60	66·3	69·7	66·9	61·7	19·7	3·5	6·5	W.	W.N.W.	Dew and fog.	do. do.
25		55	57·4	63	69·5	72·5	70·5	66·9	17·5	3	6	Light W.	N.W.	Dew	do. do.
26		62	63·8	65·8	68	68·2	65·7	61	6·2	2·5	3	S.W.	W.	Dew.	Day dark and cl
27		54	55·8	64·1	69	70·5	69·5	65·4	16·5	2·5	6·5	Strong W.	N.W.	Dew.	Light clouds.
28		50	52·5	59	66·2	68·5	65·8	57·5	18·5	6·5	8	W.N.W.	W.N.W.		Day clear and fi
29		48	50·3	59	67	68·7	66	56·8	20·7	6	9·5	Light W.	N.W.	Dew.	Day clear and fi
30	●	48·5	50·4	60	66·5	68·1	65·8	57·7	19·6	5·5	9	Light W.	N.W.	Dew.	Day do.
31		50	51·8	59·5	66·4	69	65·4	59·3	19	4·5	7	Light W.	N.W.	Dew.	Hazy. Hazy.
Mean		51·2	54·3	60.5	65.[illegible]	67.6	65.8	60.5	16.4	3.7	6.3				


C.G.
Calcutta
May 43

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BIOGRAPHICAL SKETCHES.

Lieut.-General Sir Hugh Gough, Bart.

G.C.B. K.C.S.

(WITH PORTRAIT.)

THERE is no desire more natural, or of a more pleasurable kind, than that by which we are prompted to enquire concerning those who have entitled themselves to our gratitude by the active exercise of their fortunes, their benevolence, or their talent,—or who have, under whatever character or circumstances, challenged for themselves a distinguished place in the eye of the world.

So sensible are we both of the reasonableness and the strength of this desire, that it is always a source of regret to us when we cannot ourselves gratify its longings to their fullest extent, or as fully and as perfectly contribute to their gratification in others. Like our friend Francis in the play, we do not think ourselves sufficiently acquainted with a man when we merely know his birth, his parentage and his name. We, too, would know, and so we believe would others, something of his heart—his soul—his impulses—his actions, and the motives by which he is stirred.

The consciousness of our inability to present more than the following brief particulars of the public career of the distinguished character whose portrait occupies a place in our present number, though it may abridge our individual pleasure, and that of our readers, cannot lessen our gratitude for the kindness which has placed them in our possession.

It would, indeed, afford us the highest satisfaction were we enabled to add to the account some notice of the private life of one, of whose qualities as a man, a gentleman, and a soldier, we have heard so highly. It is, however, some alloy to our regret that those qualities which have endeared him to all who have ever approached him in the various relations of his rank, his friendship, or his name, are generally understood and acknowledged, and could derive no lustre from our humble efforts to portray them.

His Excellency LIEUTENANT-GENERAL SIR HUGH GOUGH, Colonel of the 87th, or Royal Irish Fusiliers; Knight Grand-Cross of the Most Honorable Military Order of the Bath; Knight of Charles the Third of Spain, and a Baronet of the United Kingdom, is the fourth son of the late George Gough, Esq., of Nooelsdown in the county of Limerick, Lieutenant-Colonel of the city of Limerick Militia, &c. &c. &c., and Letitia, daughter of William Bunbury, Esq., of Lisnwagh

in the county of Carlow. Colonel Gough, the father of the present Baronet, is descended in a direct line from the Right Rev. Dr. Gough, Lord Bishop of Limerick, who settled in that county in 1626, and was the first of the family who came over from England: his property is still in the Gough family in the person of George Gough, Esq., of Nooelsdown, nephew to the subject of this brief sketch.

It may be said that Sir Hugh Gough embraced the profession of arms in his infancy, for we find him serving as a Lieutenant in his father's Regiment at the early age of thirteen, from whence he was appointed to the 119th Regiment, of which corps he was the Adjutant. On the disbandment of that Regiment he was posted to the 78th Highlanders,—joined them at the Cape of Good Hope, and was present at the capture of the Dutch fleet at Saldanah Bay. On the reduction of the second Battalion of the 78th, he was removed as a Lieutenant into his present Regiment the 87th or Royal Irish Fusiliers, which corps he joined and proceeded with it to the West Indies, where he was present at the attack of Porto-rico,—the Brigand war in St. Lucee, and the taking of Surinam.

Sir Hugh Gough had also the honor and good fortune to serve nearly the whole of the Peninsula war under the "Great Captain of the age," the Duke of Wellington, and commanded that distinguished corps, the Royal Irish Fusiliers, during the operations against Oporto; at the battle of Talevera, where a horse was shot under him on the 27th, and he was himself severely wounded on the 28th: at the battle of Barrosa, where the Regiment he commanded captured, in a charge, the wreathed Eagle of the 8th Regiment of French Light Infantry; at the seige of Tarifee, where he commanded and defended the breach, and was twice wounded; at the battle of Vittoria, where his corps took the baton of Marshal Jourdon; and at the battle of the Nivelle, where he was severely and dangerously wounded; he also commanded the 87th during the whole of the siege of Cadiz, and in many minor affairs on the Peninsula. On the reduction of the 2nd Battalion 87th Regiment, at the close of the war, Sir Hugh was appointed to the command of the 22nd Regiment, with which corps he was stationed for three years in the county of Cork, when a separate command was allotted for him during the most disturbed times. The brevet of 1830 promoted Sir Hugh Gough to the rank of Major-General, and, in 1837, he was selected for the Staff in India. On the 1st of March 1841, he assumed the command of the troops of the expeditionery force in China, at the head of which army he has obtained his present honors of a Grand-Cross of the Bath, and a Baronetcy.

Sir Hugh Gough is married to Francis, daughter of the late Lieutenant-General Stephens, of the Royal Artillery, and has one son and four daughters.

HISTORICAL RESEARCHES.

By Lieut.-Col. W. R. Pogson.

[It affords us much pleasure to place before our readers a continuation (though for the present a very brief one) of the Historical Researches of our esteemed and talented contributor, Col. Pogson. The portion now presented ought to have appeared in a previous number, but was unfortunately mislaid; it supplies a break in the series,—is important as connecting distinct parts of the Researches already published,—and now becomes essentially so, forming, as it does, the ground work of those which will appear in the future numbers of the Review.]—Ed.

Noah and his Sons.

Identity of Hindu traditions with Scripture History.

It having been alleged by those who know least about Colonel Wilford's writings that they are the result of impositions practised on his credulity—and it being essential to the truth of history to prove their authenticity, except in the instances in which he detected and avowed having been deceived, I am induced to cite the following passage by Sir William Jones in his address to the Asiatic Society:—

"I cannot refrain from endeavouring to increase your satisfaction at the learned Essay on Egypt and the Nile, by confessing openly that I have at length abandoned the greatest part of that natural distrust and incredulity which had taken possession of my mind before I had examined the sources from which our excellent associate Lieutenant Wilford has drawn so great a variety of new and interesting opinions *.

"Having read again and again, both alone and with a Pundit, the numerous original passages in the Puranas and other Sanscrit Books, which the writer of the dissertation adduces in support of his assertions, I am happy in bearing testimony to his perfect good faith and general accuracy."

Under the authority just quoted, the following translation of a passage, from the *Padma Puran* by Colonel Wilford†, must be regarded as minutely exact and genuine. The words in italics are inserted to preserve the sense.

1. "To Satyavarman, that sovereign of the *whole* earth, *were* born three sons; the eldest, Sherma; then C'harma; and, *thirdly*, Jyapeti by name:

2. "*They were* all of good morals, excellent in virtue and *virtuous* deeds, skilled in the use of weapons to strike with or to be thrown; brave men, eager for victory in battle.

3. "But Satyavarman, being continually delighted with devout meditation, *and* seeing his sons fit *for dominion*, laid upon them the burden of Government,

* Asiatic Researches, vol. 3. p. 463.

† Ibid, vol. iii. p. 465. 6.

4. " *Whilst* he remained honouring and satisfying the Gods, and priests and kine. One day, by the act of destiny, the king, having drank mead,

5. " Became senseless *and* lay asleep naked : then he was seen by C'harma, and by him were his two brothers called,

6. " *To whom he said :* What now has befallen ? In what state is this our sire ? By those two was he hidden with clothes, and called to his senses again and again.

7. " Having recovered his intellect, and perfectly knowing what had passed, he cursed C'harma, *saying* : thou shall be the servant of servants.

8. " *And,* since thou wast a laugher in their presence, from laughter shalt thou acquire a name. Then he gave to Sherma the wide domain on the south of the snowy mountain,

9. " And to Jyapeti, he gave all on the north of the snowy mountain ; but He, by the power of religious contemplation, attained supreme bliss."

This extract clearly proves that Satyavrata or Satyavarman of the Purans, was the same personage with the Noah of scripture, and we consequently fix the utmost limit of Hindu chronology.

It* has been disputed which was the eldest son of Noah. St. Augustine considered Shem the first born, Ham the second and Japhet the third. In the scriptures we generally find that preference is given to virtue and not to seniority, as exemplified by Enock, Abraham, Jacob and David. The origin of the controversy on this point is, that in the Latin and Geneva translations of the scriptures, Genesis x. 21. is rendered " unto them also, the father of all the sons of Heber, and elder brother of Japhet, were children born." But Junius, following the Septuagint, has, " To Shem also, the father of all the sons of Heber, and brother of Japhet, the eldest son, were children born." The difference is occasioned by the transposition of the word 'elder' ; for if it had followed Japhet, instead of being placed before it, as it is in the vulgar translation, it would have plainly applied to Japhet instead of Shem. The point, however, is not material, as the blessings of God are not conferred on the first or last born, but on the most virtuous ; yet the arguments are more in favor of Japhet, than of Shem, being the elder. Where the scriptures are plainly understood, men of judgment should reject opinions founded on conjecture. It appears that Noah, in his 500th year, begot the first of his three sons, Shem, Ham, and Japhet ; that the flood happened in his 600th† year, and that Shem begot Arphaxad, two‡ years after the flood in the 100th year of his own age, and in the 602nd of Noah.

Noah having begot his first son at the age of 500, if Shem had been the elder, he would have been 100 years old at the deluge, in the 600th year of Noah, and not 100 two years after the flood. In Genesis xi. 24, it is also written "that Noah awoke from his wine and knew what his younger son (namely Ham) had done to him." Then, as Ham was the younger, and Noah began to beget sons, in his 500th year, and Shem was 100 years old when Noah was 602, it follows that Japhet was

* Sir Walter Raleigh. † Genesis, vii. 6. ‡ Genesis, xi. 10.

the elder; because he was born in the 500th and Shem in the 502nd year of Noah. The vulgar and the Geneva translations render it, the younger son, and Junius, his youngest son.

St. Chrysostom makes Ham the 2nd and Japhet the youngest brother, but states that Ham was deprived of preeminence of birth and disinherited because he derided his father.

Pererius conceives that Ham was called the younger, in contradistinction to Shem the elder, and that the Hebrew does not express the difference between the comparative and superlative,—which however, I take leave to doubt, Hebrew and Arabic being defacts indentical; the latter contains not only a superlative, but a double superlative or hyperbolical case as is examplified by the term "most highest," &c.

It is true that Shem is always placed first, and in Genesis x. 1, he is named before Japhet: but, in the second verse, Moses leaves Shem, and records first the children of Japhet. The first place was apparently given to Shem, because he was higher in election and estimation, as the progenitor of the Hebrew nation, Abraham, the prophets, David and Jesus Christ. Therefore, let the reader decide whether we shall follow the vulgar, Pagninus and the Geneva version, in adopting the translation, "Shem frater Japhet major;" or the Septuagint, Junius and Tremelius, in having it "Shem fratri Japhet majoris;" or with Pererius, "Shem frater Japhet ille magnus;" inferring Shem to have been the great and famous brother;—but there appears no reason to doubt that Japhet was the eldest; for, although Pererius assumes, in reference to the age of Shem at the time of the flood, that the scriptures took no account of small numbers, yet such is by no means the case; for it is written in Genesis xi. 10, that Shem was 100 years old and begat Arphaxad two years after the flood; and, in the 12th verse; "so Shela lived after he begat Ebar 403 years," and the units of the different ages are severally recorded from the 10th to the 21st verse.

It is related in the *Padma Puran* that Satyavraman was particularly fond of his eldest son Jyapeti, or Lord of the Earth, to whom he gave all the regions north of the Himalaya or the Snowy mountains, which extend from sea to sea, and of which Caucasus is part.

To Sharma he allotted the countries to the south of those mountains; but he cursed C'harma, because when the old monarch was inebriated with a strong liquor made of fermented rice, C'harma laughed; and it was in consequence of his fathers imprecation that he became a slave to the slaves of his brothers.

The children of Sharma travelled a long time until they arrived at the bank of the Nílá or Cálí, and Colonel Wilford mentions a passage from the Puran, orally communicated to him, stating that their journey began after the building of Padma Mandira, which appears to have been the tower of Babel, on the bank of the river Cumudvati, which, he says, can be no other than the Euphrates.

On their arrival in Eygpt, they found the country peopled by evil beings, and by a few impure tribes of men who had no fixed habitations. Their leader, therefore, in order to propitiate the divinity of that region, sat on the bank of the Nile performing acts of austere devotion and praising Padma devi, or the goddess residing on the Lotos. Padma at last appeared to him and commanded him to erect a pyramid in

honour of her on the spot where he then stood. His associates accordingly raised a pyramid of earth two cros long, one broad, and one high, in which the goddess of the Lotos resided, and it received the name of Padmâ-mandira, or Padma mat'ha ; Mandira signifying a temple or palace, and Mat'ha or Mer'ha a college or dwelling for students, for the goddess instructed Sharma and his family in the most useful arts, and taught them the Yacsha-lipi, or writing of the Yacshas, a race of superior beings of whom Cuvera was the chief. It does not clearly appear on what occasion the Sharmicas left their first settlement, which had so auspicious a beginning, but they probably retreated to Sharma st'han, called also the mountainous region of Ajagara, in the reigns of Sani and Rahu, when the Devatas, among whom the Sharmicas were included, were compelled to seek a refuge in the Mountains. A similar flight of the Dévatars is however said to have been caused by the invasion of Deva-Nahush, or Dionysius*.

(*To be continued.*)

ROUGH NOTES OF A VISIT TO ST. HELENA FROM CALCUTTA IN 1842.

By Harvey Hitall.

[We are obliged to our somewhat eccentric and satirical correspondent, Harvey Hitall, for the preference he has given the *Review* for the publication of the Notes. In placing them before our readers we, nevertheless, candidly state that had the MS. reached us from the near plains of Ind, instead of the far off rocky Isle of Britain, we should, 'ere sending to press, have ventured upon the liberty of suggesting to the author certain omissions under which the article, without detriment to its general interest and utility, would have better suited the character of our Journal. Under existing circumstances, however, we feel that we have no choice between the insertion of the entire article or its entire rejection ; this latter alternative we trust our readers will agree with us in thinking we have done right in avoiding.]—Ed.

After a delightful and somewhat speedy voyage of 55 days, about an hour before sunset, we first saw the faint outline of the island of St. Helena, lying right a-head, and distant about 40 miles. We prepared in consequence to advance under easy sail during the night, by lowering our skysails, royals, and studding sails, &c.

Anxious to gain an early view of the long expected shore, I rose at five in the morning (or more nautically, at two bells,) and found the gallant ship "Agincourt" running under its lee at the rate of six knots, within a mile of the dark massive rocks on our larboard. The spectacle was at once grandly impressive and beautiful.

After sunrise we could clearly discern the various stratifications of the basalt or lava (traversed by vertical dikes), of which the island is entirely composed.

* Asiatic Researches, vol. iii. p. 313-14.

Sailing smoothly over "the dark blue sea" for about half and hour, we next observed several vessels lying at anchor, a little beyond a projecting corner, and in due time we dropped anchor amongst them, when within about 800 yards of the beach, lashed by an ever angry succession of thunder causing breakers, that excited great curiosity amongst the children on board, none of whom had ever before seen surf. At particular spots, it threw up its spray to the height of 40 or 50 feet, which descended slowly in the form of parabolic mists. Soon after anchoring and furling sail, we were officially visited by the Colonial Surgeon and Health Officer, Mr. Solomon, who approached us in a registered boat, hoisting a flag at her stern. He enjoys a fee of ten shillings for every ship he visits; their number in 1841 amounted to 854. Hence *his* bread and butter. It was his duty to inspect our ship, and report whether or not we were to be permitted to visit the shore, or be subjected to the strictest Quarantine. The time spent in the enquiry was an anxious and interesting interval to us all. Unfortunately, we had brought the measles with us from Calcutta, and had then one case of the disease on board.

The duty of our Surgeon was most conscientiously performed, unpleasant and invidious though it was; and we were ultimately compelled to hoist a nasty yellow flag at our foremast head, to warn off all from holding any communication with us, except through the debasing medium of the island policemen, one of whom accompanied every boat that came near, for none of them were allowed to touch our ship.

Soon after, in pursuance of the island regulations, we were visited by two more professional gentlemen, composing a Medical Board, but they kept at a very respectful distance, and disappeared after asking a few questions.

Amongst certain classes of society, it is evident that a sensation called 'conscience' still exists, having apparently a sort of hold over their prejudices; and it is perhaps on the whole desirable that it should be suffered to remain uncombatted by the Philosophers who despise and reject it, inasmuch as it may be found useful for the preservation of "social order, and virtue, and all that sort of thing."

But, in every rank of society, thank heaven! men may be found ready, if not anxious to meet the wishes of their superiors in rank or fortunes, by a sacrifice of any little feeling incompatible with their own private interests; and hence, should the captain of an Indiaman infected with the small pox, be visited by the health officer, his surgeon may be found silent as to the existence of the loathsome disease. Verbum sap.

When the ominous coloured flag was once fairly visible, the different bumboats surrounding us were instantly scared away, and left us "alone in our glory."

These departures were deeply regretted at the time, for they contained hampers of purple grapes, large yellow peaches, bread, potatoes and similar dainties, being then in complete ignorance of their respective qualities and low prices.

The islanders, it must be confessed, are very diffident in their charges, and nobly scorn to take the slightest advantage of the monopoly they enjoy; indeed, so much on the contrary, that Government has encouraged them by fixing the minimum price for which their produce may be sold!

Mais à nos moutons. Soon after we had anchored, I observed that we were evidently changing our position, with regard to a ship on our right, with which we were first parallel; and I declared that we were drifting. The Captain on hearing this, referred to the chief Mate, who ran to the compass, and stated that our bearings to two points were unchanged. However, in less than ten minutes after, it became perfectly evident, that we were drifting out to sea most rapidly; and, on weighing anchor, we discovered that by some accident it had parted from the cable, taking with it some fathoms of the chain, the links of which were no less than 1½ inches in diameter. Unfortunately no buoy had been affixed, and hence we had neither the means nor the time to recover it. The Harbour master, however, will probably weigh it, and receive the usual salvage of one third.

I think it is very probable that the chain broke from the effects of a jerk, on the anchor slipping down from the edge of a precipice, under which the surplus chain had fallen and dragged it.

All hands were speedily roused up to set sail, which being cleverly done, after a couple of tacks, we again cast anchor in front of James's Town, within 400 yards of the beach, and commanding a most beautiful view from the top to the bottom of the valley in which it is situated.

The town run up towards the hill, and the various colors and shapes of the houses render it highly picturesque. They are all pitch roofed, and apparently covered by red tiles. The walls are very solidly built of basalt, cemented with lime, found in a nodular state in the bottom of the vallies.

A large barn looking building in front, is inhabited by the Governor, and is therefore dignified by the title of "The Castle." On its right stands an equally elegant church or chapel.

The soldiers' barracks stand high up the valley at the end of the town.

A low and powerful battery of cannon and mortars closes the gorge within a few yards of the breakers. The landing place stands in still water to the left, close to a range of houses, the official residence of the harbour master.

The entrance of the Town is to the extreme right, passing over a drawbridge guarded by a centinel. At the upper or higher end of the valley, in the midst of a blue patch of Pineastas, appears a picturesque and substantial mansion, called the 'Alarm House,' at present occupied by a gentleman.

During our two days' stay, in the middle of March, no fewer than 8 showers of rain, besides many threatening clouds, passed over this spot in the day time, and traversed the whole valley, seemingly restrained by its massive bulwarks, and seldom extending on its flanks.

With exception of the green and lovely masses of the "Peepul" on the left of the town, a small row of (to me) unknown dark garden trees in front, and the above patch of mountain firs, not a single green leaf was visible over the whole front of the island, with the aid of a powerful telescope,—no, not even a blade of grass! This sufficiently demonstrates the most shameful negligence and utter want of enterprise on the part of the past Government or islanders, as no one can doubt but that there are hundreds of species of trees procurable from the Cape or other parts of Africa, India, Madagascar, &c., &c., that would

thrive most luxuriantly, and at the same time furnish fodder to sheep and goats during the droughts, which, at other seasons of the year, are said to harass the labours of the husbandman. They would most unquestionably attract moisture, and thus enable them to raise crops for the subsistence of cattle at present imported from the Cape, or extend the breed of Merinos already on the island, the wool of which has realized a good price in the London market. In the Simla Mountains, sheep are fattened on the leaves of a quercus or oak, which is purposely pollarded.

The butter consumed is also imported from different countries, as out of all the residents, only two gentlemen make enough for the use of their own families. Agriculture seems either to be but little encouraged by the powers that be, or found to be less profitable than the commerce, such as it is, which they persue.

The potatoes sent as a present prove what might be done, for they were of a large size and superior quality: but those imported and sent off for the ship's use, were dwarfish and indifferent. Carrots turnips, knohl kohl, and cabbages, are all procurable, but at rather startling prices.

Such fruits as were received from Solomon, the Consul and sheriff, were, it must be allowed, sufficiently indifferent. Peaches of two sorts, one of a large size, with deep yellow and firm flesh, a clingstone of a fair flavor, but at the period hard enough to alarm any individual accustomed deeply to venerate the healthful functions of his chylo-pactic viscera. The other a free stone, resembling the inferior sort procureable all over India, of a decent quality, but small and unattractive, like the self esteemed belle of Calcutta. The grapes were purple, fleshy and of no particular quality. The figs of a good size, externally green and smooth, of fair quality when thoroughly ripe.

Pomegranates, always a very suitable food for squirrels (excepting the species procured in India from Cabool) were harsh, bitter and worthless.

The Pears large, but only fit for baking or stewing with claret. A gentleman belonging to the staff of the island, was so kind as to meet the wishes of one of the lady passengers, by sending a couple of dozen of the apples, but as these were appropriated to the use of other persons, I could only ascertain by enquiry, that they were of the baking sort. The plantains were large, coarse, and void of all delicacy.

Mackerel, and other fishes, were procurable in abundance, at all seasons of the year, but only at the fish markets; the power that taxes the fishing boats at a pound sterling per annum, preventing the poor and laborious owners from visiting the shipping, until the islanders are first served!—thus taking a fatherly care that they may reach the humble mariners "who go down to the sea in ships," in a state of incipient putrefraction! Thousands of makerel were seen around the ship, but as they will not swallow any but fish bait, a considerable time elapsed before our anxious juvenile sportsmen could secure any, and after all only two or three were bagged.

I was informed by one of the ship's officers that albacores are perfectly poisonous if kept a second day, whether with or without salt. The symptom being dreadful headache, vomiting and purging, followed by ulcerous blotches on the body. They are procurable at the market

for a penny a pound, and are a coarse dry fish, like all those of the deep sea. The yellow sprat-bill, and many other fishes of the West Indian islands, being almost certain death to their consumers, but I am not aware whether or not they have been subjected to chemical examination. I could not hear of any shellfish, but dead shells of a large conical shape, were amongst the articles brought for sale in the bumboats. Considering the great depth of the sea, and the acclivity of the beach, it is not probable that any but the largest shells could bear to be dashed on the rocky beach.

Leeches for medical purposes, as a distinguished functionary informed an inquiring friend, are extremely scarce, *but any quantity* may be procured at the very low rate of two shillings a piece! From excessive benevolence, and not from personal sympathy, he is induced to breed and supply them; but I have not yet heard that his philanthropic conduct has been brought properly to the notice of those who distribute the honours and rewards of our most gracious Queen! There is neglect somewhere! Mais a nos moutons. (As that sentence has been introduced a second time, I beg to acquaint your readers, that as it is nearly all the French I know, I am bound to make the best of it.)

The gardens furnish beautiful flowers in abundance. We were most kindly and liberally supplied by Colonel Hodgson and Captain Alexander of the engineers, with enormous nosegays of Fuschias, Hydrangeas, Roses, Daulias, Myrtles, &c. &c., which were most acceptable presents to our ladies, and an agreeable regale to the eyes of weary voyagers.

Flowers, to use the beautiful language of one of our largest living poets, are—

> "Earth's tribute to the pure,
> And cheering solace to the soul subdued!"—(*Zaina*).

The late Dr. Roxburgh, formerly superintendant of the Botanical Garden, a place now held by that eminent botanist and universally esteemed man Dr. Wallick, published an avowedly incomplete list of the indigenous flowers of St. Helena, in 1813. The most curious amongst them appears to be the "Dicksonia Arborescens." At the apex clothed with long soft tawny brown wool, like that of which the finest shawls are made"—(evidently Putto!)

The most valuable, the "Dombeya Melanoxylon," or native Ebony, having large beautiful flowers, of the wood of which it is said that "the exterior surface is pretty even, and of a dark lead color, having been exposed to the weather, for probably some hundreds of years: within it is nearly as black as common ebony, and as close grained, hard, and heavy; in short it is so very like ebony, as to have procured it that name from the islanders."

In a few more hundreds of years, we shall learn the specific gravity of the wood.

Before I go farther, I beg to observe that I strongly protest against the use of many compound words that do not convey any specific meaning.—'*Nosegay*' for instance. The word should be '*eyegay*' for evident reasons! If it be desirable to allude to pleasures of sense, as conveyed through that venerable organ the nose,—it ought to be "*nose-please*" or "*nose-sweet*!" Take another word, '*Namesake*;'—

does it convey an idea that two persons enjoy the same surname or patronymic ? Certainly not; but "*name-same*" or "*name-like*" would ! Who in the present day would dare to use '*coynominal?*'—Will you avoid them in future?

At St. Helena we have a practical illustration of the employment of expensive machinery for cutting cabbage sprouts ! It is the true Paradise of Phoralifts. I was informed that the *whole* population amounts to only 4000 souls ; and during a long period of the most profound peace, the following establishment is deamed necessary for its perfect government :—

A Regiment of Infantry.
A Quant. suff of Artillery.
A Governor and Vice Admiral (two in one, a Maj.-Genl. in the army)
A Legislative Council, with President and Council.
A Colonial Office.
An Audit Office.
A Custom House.
A Supreme Court.
A Police Department.
A Vice Admiral, and Vice Admiralty Court.
A Government Printing department.
A Time Officer (!)
A Civil Engineer department of eight functionaries.
A Civil Medical establishment.
A Health Officer.
A Clerical Establishment of five persons,
A Government School Establishment.
An Upper and a Lower School and a Plantation country School, (the extreme length of the island being about 10 and its breadth six miles !)
A Board of Commissioners of Crown Property.
Church Wardens.
Country Collector.
General Staff.
Royal Engineer Department.
Commissariat Department.
Colonial Service Department.
Ecclesiastical Department.
St. Helena Local Militia.

The above are extracted from the St. Helena Calender, for 1841 and I am not responsible for its correctness.

(But after all, no Government can be said to be complete without an university, a Cathedral with a suitable staff, and the Corn Laws ! Let a petition be therefore prepared by the Legislative Council, and forwarded through the Colonial Officer to the Government for transmission to Her Majesty's Government ! and it shall be backed by the full weight of my personal interests with the Crown.)

But as the above officers must be respectably supported, the following taxes are laid on the working classes.

	£.	s.	d
Keeping a Tea or Coffee Shop	5	0	0
Fishing Boat	1	0	0

Retail Spirit and Wine licenses (annual)	220	0	0
Ditto, ditto, per annum in town	150	0	0
Wholesale Spirit and Wine license per annum	25	0	0
Retail Wine license in the country	30	0	0
Passage Boats	3	0	0
Luggage ditto	4	0	0
Billiard Table	20	0	0

N. B. as the Calender does not specify whether or not the tax be confined to public tables, I presume that a private one would be equally taxed.

Auctioneer	5	0	0
Attorney and Notary	5	0	0
Game licence of different kinds, from ......2 to	3	0	0
On Dogs above 10 months old	0	10	0

(N. B. This goes to the parish !)

But then to encourage trade, Cape Brandy, Arrack, Bengal Rum, acqua ardente, are wholly prohibited ; and a duty of only ten per cent. exacted on coffee, cocoa, chocolate, tea, pepper and spices, sugar-candy, tobacco, cheroots, segars, curry powder, sauces, sago, groceries, confectionary, drugs, woollens, cotton, and silk of foreign produce.

The effect of these laws is, that every soldier and slave, is retained on salt-beef, salt-pork and biscuit, at the public expence ; and that the residents consume as few of the necessaries and luxuries of life, as any British subjects under the sun. It is somewhat difficult to understand why Cape brandy should be entirely prohibited, and not Cape sheep and potatoes ; salt meat is also consumed by the whole of the inhabitants.

St. Helena might be rendered a second Singapore, were equal advantages granted, and I see no reason why the inhabitants should not be allowed to find 'every man his own market, and every market its own level ;'—the very pith and marrow of Political Economy.

The sugar cane and coffee plants have been introduced, and flourished exceedingly, and the silk worm has been successfully reared ; but none of them cultivated to any extent nor for any useful purpose. The malt liquor brewed on the island, although weak, is said to be well flavored.

Saddle horses and even carriages can be hired, the former at 15 shillings, and the latter at £4 per diem ; and although, from the shipping, the roads appear to be too steep, they are by no means so difficult to ascend as might be imagined ; as I ascertained that a horseman can gallop both up and down without danger, the road being bounded by a parapet of rubble.

I had heard wonderful accounts of the strength of the fortifications of St. Helena, but a superficial examination induces me to believe them grossly exaggerated. I am of opinion that any enterprising and determined enemy, would now a days find but little difficulty in effecting a landing. That being accomplished, nothing need be feared. There is certainly an abundance of cannon, but, in my judgment, most carelessly if not ignorantly distributed. The circular battery (in part en barbette) on the left, is well placed as to the situation, but most injudiciously as to height, for it ought, on proper principles, to be no higher than a few feet above high water. At present, from its altitude, its guns would not work their full mischief. The guns perched

on the face of the hill would plunge so much, as to be comparatively useless; and those on the very top, would, for the same reason, merely contribute a pleasant martio-musical hum. I presume that they were originally placed there in the belief that they would command a greater range! They ought, to be placed on the sides of the valley, so as to cover the road, and command the low battery of the gorge. There are furnaces for heating red hot shot, for the destruction of shipping, but a well concerted night attack, by steam-ships of war, would not allow sufficient time for the due preparation.

As I happen to be in the market, I shall not object to lead the assault for a proper consideration.

The tide rises from 18 inches to two feet at St. Helena, because the sea is so very deep; but in divers other shallow places, from 15 to 40 feet, because of the shallowness: and yet the whole of the combined forces of the sun and moon cannot raise the waters of the comparatively shallow American lakes, nor alter the course of the trade winds, and *apparently* depending oceanic currents; no, nor carry along with them the clouds of our atmosphere. Philosophers may tell us plain people how this happens.

English, American, Dutch and French ships (including men of war,) frequent the anchorage in great numbers, for supplies and water. The latter article is easily procured with the gratuitous use of the island boats, at the low rate of three shillings a ton from a large cistern near the landing place.

During the year 1841, no less than 854 vessels touched for those purposes. Of which were:—

English	531
French	44
Dutch	125
American	109

The English from our kingdoms in India;—the American chiefly from India, China, and Singapore; and the Dutch, generally from their valuable island of Java. The remainder from the small states of Europe.

The island population in 1838 cast off their first swarm of 120 souls to the Cape of Good Hope; although in 1807 they lost 1300 children by the measles. Only 7 infants on the island escaping the disease. Ever since that period, the most watchful vigilance has been exercised in guarding against the importation of contagious diseases. At present there are more than 2000 children, indeed Mr. Solomon assured me that it was their favorite manufacture. I am so young and inexperienced, that I feel considerable reluctance in intruding my opinions of the wisdom of those reverend personages who framed the insulo-quarantine laws. I doubt whether it be not safer to pass through the diseases of infancy in a mild and delightful climate, during early adolescence, than when the hair on the chin has become bristly, and under the influence of variable and stormy regions.

On anchoring, we counted no less than seven small hulks in all stages of dismantling—besides two sloops ready for service. These had been used as slavers by the Spaniards, Portuguese, and Americans; and were said to be American built, and first rate sailers; they had been successively captured by the ships of war belonging to Her Majesty

the Queen, and all had been condemned by the Vice-Admiralty Court. Amongst them was the celebrated "Gabrieke," the master of which, proud of her superior speed, amused himself by sailing, in contempt, around H. M. gun brig *Acorn*, until, in his extreme fool-hardiness, he thought proper to venture within range of her guns, when a spar or two having been shot away, the slaves and crew were carried into St. Helena. One of the vessels, in good order, is now used as the Colonial Packet to the Cape, and the other for the purpose of overtaking vessels that have recently left the port. No less than 1700 slaves are now rationed by the British Government at this small and remote spot: 1000 near the town, and the remainder at Lemon Valley. The latter are now suffering under the ravages of small pox; so that, instead of having been prohibited from landing, we ought in all honesty to have been warned off the island!

Four hundred of the slaves, or "*Liberated Africans*" as they are facetiously called, are now awaiting the approaching departure of the Ship "Lady Rowena" of Liverpool, destined for Demarara, where (to continue the jocularity) they are to be "*apprenticed*" for 5 years to sugar planters. That is to say, they are to be clothed and fed according to act of Parliament, and worked as their masters choose.

On the same terms, any British subject, on giving security, may obtain one or all. This security is, in every sense of the word, a dead letter, if money be not lodged in the treasury on their account, and if it were, the trouble to all parties, would be almost infinite. Let us suppose that they fall into the hands of the ordinary run of planters; they will be then placed under the same class of men as before, when it was found necessary, as a measure demanded by humanity, to destroy slavery:—therefore in what particular manner will they have benefitted? By the change of name from slave to apprentice? It is a mere sound. They are at present slaves, confined to the island; they cannot even leave the areas of their dwelling houses. In the choice of their future homes, their wishes are neither known nor consulted. They may be repeatedly transported from one end of the world to the other, either by land or by sea; and during their course of "apprenticeship," it must be allowed that they continue to remain as much slaves as when they were first shipped; and that before the expiration of the parliamentary period, a great number may probably perish in slavery, either from change of diet, climate, confinement at sea, or over work on shore.

The purity of our intentions is beyond all doubt and question, but we have inadvertently subjected ourselves to the imputation of having supplied our own subjects with slaves, procured at the cheapest possible rates, and thus, with directly profiting by the infamous traffic we are, in reality, anxious to discountenance and destroy.

The powerful and godlike voice of philanthropy must be again raised that the good work may be made perfect by some judicious and unassailable mode of disposing of the captured Africans; and although the problem may appear one of solution the most difficult, still we may reasonably hope for final success.

Britons may be believed when they declare their attachment to civil and religious liberty; for the liberation of the West India slaves, I deem the most brilliant event, and the greatest moral victory yet accomplished since the creation of the world.

During our voyage towards the island, we met with no less than six quick sailing slavers, sailing from or to the coast of Africa—to or from the American continent!

Fossil remains have been recently discovered, not, as I had expected, in the calcarious deposits at the bottom of the vallies, but in a vein to the N.W. of the Flag Staff, at an elevation of about 1611 feet above the level of the sea. I regret sincerely, for this sole reason, that I was unable to land, for I am still of opinion that were a proper search made by any person, above the ordinary intelligence of a lime burner, it would be rewarded by a greater abundance and variety.

Pheasants, wild rabbits, and red legged partridges (the Chucore of India), afford abundant amusement to sporting characters; but a license is required. The wild fowl of India, and the guinea fowl, might also be imported with equal success. All the English singing birds "goldfinch, chaffinch, bulfinch, and all the little finches of the grove" have long since been naturalized; and the common mina of India, has lately made its appearance on the island. Not a single venemous reptile exists within its circumference.

St. Helena has lately gained additional celebrity from having been for many years the prison and temporary grave of Napoleon Buonaparte, once Emperor of France.

A Prince of the Blood Royal of France, was, with curious discretion, selected to convey his "mortal Remains" to the shores of 'Young France', in one of her frigates. The exhumation and transit were performed with great pomp and circumstance, and if the reader be, like myself, an humble admirer of bathos the most profound, and humbug the most indisguisable, I would most strongly recommend him to peruse the pamphlet, composed and published on the solemn occasion, by a spectator of the sublime process. Nor are the lithographic prints which illustrate that valuable reading inferior to the melting pathos and innumerable sonorous passages with which it abounds. For my part, I was so exceedingly affected with the eloquent narration, that I forthwith endeavoured to express my feelings in the following Hepatitic verses, presented to the intelligent reader as a finished composition, worthy of the subject. If it should be discovered that any of the lines have already appeared in the production of Pollock, Milton, Southey, Cowper, Thomson or Rogers, that circumstance is to be imputed, not to plagearism, but to a singular "coincidence"—Bus.

THE EXHUMATION OF NAPOLEON.

Around they stood and grinned; a solemn awe,
(Experienced oft by Addiscombe cadets),
Crept through their marrow bones, while laborers,
Hired by the job, and paid according—ly,
Dug up the carcass of Napoleon,
In power belov'd, but in adversity,
From Hell to Hackney unreluctant kicked,
The mock of kindered souls, th' enduring shame
Of those he fondly lov'd, on Seine's proud banks,
But butchered for his glory. Vive la France!
(That's not the fashionable phrase.) The tomb
In workman style was knocked about, until
The hole, in which the three-fold coffin lay,
Of HERO, (once with glory crowned, of late

With bricks,) was bathed in southern sunshine, bright
As gay gamboge, in Turner's brilliant tints.
His much lov'd phiz, the fractured chest displayed,
Tho' stale, yet sound, as Grove's fat Venison.
But to correct details. On chin, perhaps,
A Mechi's razor was required, well strapped ;
The Epaulets were tarnish—ed a few ;—
But the Jack boots, (be still my throbbing heart !)
Unbrushed for years, far mouldier than cheese
Of Sussex manufacture, lay disclosed !
One Hero grasped his bunch of fives ; but one !
But none, as I can learn, shed tears,
Such as French warriors shed in battle field.
(Quick let us weep, while yet untaxed by Peel,
That liquid income tax of woe.) Proceed :
His heart, (that heart which failed him at Moscow,)
Found shelter in a "Vase" ; but in a cup,
His stomach lay enshrined. A silver plate,
A knife, and fork, and spoon ; a ewer too ;
Of gold, twelve pieces, and three silver coins,
To pay for turnpikes, crossings, Turtle soup,
And such like trivial things, between his legs,
Unfilched remained, proving the honesty
Of Islanders remote. On ponderous car
The weighty burden laid, off strutted all,
The high born Prince, the valet, and the Peer ;
At that slow pace, ordained by martial wont,
Ycleped by y kelish recruits "the Goose."
The sea approached, in solemn mockery,
The guns boomed loud from British batteries,
Above, below, and midway in the air,
Which Joinville echoed from his Frigate's walls.
Cobbett, that moral Buonaparte, brought
From distant Yankee-stan, old Tom Paine's bones,
And for the deed obtained a nation's scorn,
Contempt and obloquy. The wiser French,
Late in the day, 'tis true, have deified
Th' insatiate leech that wallowed in their blood,
Th' incarnate curse of man, Hell's own war hound,
That tracked repose and peace to distant lands,
With famine fire and sword ; but on repulse,
To his snug kennel hied, with drooping tail.
One generation raised him to a throne,
Then coolly saw the smitten tyrant cast,
To drear captivity, and wailings loud.
(What Frenchman mourned when murdered Toussaint pined
In Joux's dark dungeon caves, bereft of all
His martyr spirit loved ? Or, is confined
Their boastful nation's warmest sympathy,
To meteor monsters of their fickle race ?)
A second placed him, silver knife and fork,
With ewer, golden pieces, silver coins,
(As were before ennumerate), 'neath glittering dome,
Less hollow than his heart, there to become,
Rebellion's focus and sedition's shrine
Obscene, where congregated knaves may vow,
In his dread name to wage an impious war,
Against the toil worn peasant's humble hearth,
Or gorgeous palace, pinnacled and proud ;
Their watchword "glory,"—robbery their end !
The third (or else I prophecy in vain).
The third shall waken from his hideous dream,
As doth the maniac from his fantasies,
Aghast with horror, wonder and despair,
Their past delusions mourn, their idol curse

With bitterness intense ; and then, as slaves
From galling chains too suddenly released,
Shall, self abased, with imprecations stern,
Destroy each symbol of his hated name,
Despoil his thrice dug grave, and strew his bones
In loathsome carrion heaps, the prey of beasts impure !

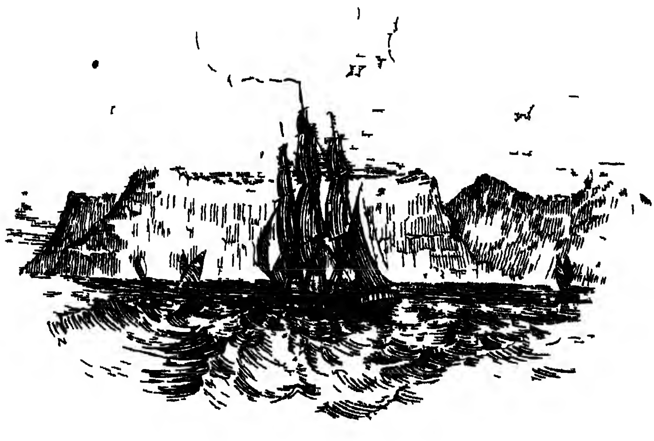
By the bye, is the Laureateship vacant ?

I wish that I could convey to the reader any idea of the extreme purity of the atmosphere of these regions. Such was the brilliancy of the starry Heavens, that we fancied that we could easily determine their relative distances ; those nearest us appearing as if we could put forth our hands and clutch them, while thousands, invisible in other climes, rendered the sky one mass of brilliants.

St. Helena stands in latitude 15° 55′26′ south, yet, notwithstanding, its temperature appeared very delightful to old Indians. The month of April is the hottest in the year, and the thermometer then rises, at James's town, to 78° 9. July and August are the coldest months, when it falls to 70° 2, at the same place ; but at Longwood it falls as low as 50° 3 : its mean temperature is 61° 6. M Lepoy's calculation has proved Acteons peak to be the highest on the island, and at 2,697 feet. In various parts of India, it is by no means uncommon to find the mercury standing during the months of April, May and June at 125° *in the shade ;* but at Culpee, and most probably at Banda, and other parts of Bundlecund, it is often found to rise to 150°, *long after sunset ;* and at the dawn of day, it is but little lower. In fact, during the above months, the earth never cools. The soil is generally black, basaltic debris, and its numerous chains of hills are composed of *black* rocks which reflect no heat.

In positions favorable to the accumulation of heat, viz., in the rocky coves above Banda, Kalinjin, and Adjee Gurh, I should suspect it to be something very incredible ; but I suppose the above are sufficiently staggering to untravelled Feringees.

Humbug Cottage, Regent's Park.



PULPIT SKETCHES.

Taken in the City of Palaces.

No. I.

The Rev.-

My Dear Mr. Editor and Gentle Reader.

Do not be unnecessarily alarmed. The above announcement is not intended to convey the impression that there is in Calcutta a rival to Mr. C. Grant, whom not to know would argue yourselves unknown,—a gentleman whose prolific pencil has made the public familiar with the external personal peculiarities of a host of men who have attained local eminence as lawyer's, authors, editors, statesmen, politicians and soldiers. I am no competitor for fame in the department in which Mr. Grant has achieved such extensive and deserved celebrity. My sketches will be found to be of a very different kind, and will in no way interfere with those either of the artist or the biographer. Let each of these continue to enrich the *India Review* with their contributions. Let us every month have a sketch in lithograph and letter-press of some man, whose talents and position have made him public property, and whose virtues and utility merit the memorial which the *India Review* can raise. All I ask is, that you will allow me to express the thoughts and opinions I entertain of some of your metropolitan preachers, as put to paper after returning from one or other of the Christian places of worship in this town. From the corner of an obscure pew I see the preacher "at home,"—I mark his peculiarities,—I try to understand the structure of his mind,—I carefully note the doctrines to which he aims to give peculiar prominence, the methods he employs to reach the feelings and the judgments of his congregation,—in a word, *how* he seeks to "*win souls.*" And having done so, I am in the practice of perpetuating my recollections by taking up my pen and recording my own estimate of the Pulpit qualifications of the man I have just listened to.

Don't misunderstand me. I am no lover of novelty, I am no fastidious hunter after what are called popular preachers. I should prefer sitting under the stated ministry of an evangelical, plain and earnest man

> "By whom the violated Law speaks out
> Its thunders, and by whom, in strains as sweet
> As angels use, the Gospel whispers peace."

But, I nevertheless, like to hear the various ministers who in the aggregate supply the spiritual instruction of the people, that I may rightly estimate the extent of the privileges which the christian population enjoy. I have, therefore, from duty rather than inclination or habit, visited the different Churches of Calcutta, and to-day send you my first Sketch. I shall mention no name or denomination. If there be either truth or fidelity in the likeness, it will recognized, and if not it would be wrong to apply that which is inaccurate to any of the esteemed pastors of this town.

I went to hear the Rev. ———. I was early in the church, and had ample time to observe the deportment of the congregation as they entered and took their seats. It was serious and quiet. The preacher at length entered from the lower end of the church, and advanced up the aisle to the pulpit. I was prepossessed in his favor at first sight. In figure he was tall and erect. In demeanour he was solemn and collected. His forehead bespoke intellect—the expression of the countenance, deep thought and high mental discipline. I said to myself he is a man of education and refinement—a christian gentlemen. He spoke, and his tones were clear, his manner deliberate, his syllables and sentences well divided, his emphasis correctly placed. and his language pure, simple, and well chosen. The discourse was in the form of a lecture. It was read from the manuscript, but with a degree of freedom and ease of delivery, that assured me that the subject had been deeply studied, and that the thoughts expressed were the preachers own in the rightful sense of the word. The manner of the preacher recommended the matter. He was in earnest. His own mind was evidently in the subject. It was equally evident, that he was not preaching himself, or parading his own wisdom. His object was the spiritual welfare of those before him. His lecture might have served as a model. It was the discourse of a Master, who saw the end from the beginning. He argued, but there was no redundancy. He established his position and passed on. I felt convinced that he was capable of defending every point by more abundant proofs, and commended the judgment displayed in the choice of brief but cogent and satisfactory reasons. He was not striking, or ingenious, or pathetic, in the ordinary meaning of those words. I was not once startled by originality, or called upon to admire one subtle metaphysical abstraction. The speaker aimed at usefulness, and had no time to minister to a love of the wonderful. In every sentence he inculated some lesson of deep practical importance It was saving truth that he was teaching, and he sought not to embellish it by tinsel or drapery, but to present it chaste and unadorned, save by a diction equally free from vulgarity on the one hand, and an affectation of pompous dignity on the other. He was acute, discriminating and conclusive. He said not all that might have been said, but he said enough. His argument was complete without superfluity, and satisfied the judgment while it left room for amplification. In enforcing upon his hearers the lessons to be deduced from the subject, he displayed the same good taste. He did not offend by needless reiteration, yet he left no way of escape open, from the responsibility of adopting the conclusions to which he had brought them. His discourse over, however dissatisfied with myself, I was ready to confess that the preacher had done his duty. My intellect and my heart alike responded to the truth of his statements, and the perfect reasonableness of his demands. One portion of holy writ had been made intelligible in its meaning, and infinitely important in its bearing upon my own personal and eternal welfare. I felt satisfied, too, that the preacher had done his duty, and, in the impressive language of Scripture, had delivered his own soul.

In conclusion, let me congratulate the people of Calcutta upon having among them such a man as the one I have described. Let them remember too, that in proportion to their priviledge is their responsi-

bility; where much is given in the way of precept, much will be required in the way of practice. Though far distant from the homes and the altars of their native land, they are favored with the living ministry of a man, whom it is impossible to hear without admitting the clearness of his credentials, the authority of his message, and his high personal qualifications for the holy office he sustains. He is to them in the stead of that great teacher, who has sent forth his disciples into all the world, to preach the gospel to every creature; the counsel he gives, is the whole counsel of God. He that hath ears to hear, let him hear, and learn from the lips of a man, whom we are persuaded can set his own seal to the truth of what he says, the words that are able to make them wise unto salvation, though faith that is in Christ.

CATHOLICUS.

CORRESPONDENCE.

THE REV. KRISHNA MOHUN BANERJEA IN REPLY TO THE REV D. EWART.

To the Editor of the "India Review."

SIR,

It is with great reluctance that I sit down to address you once more on a subject which can be interesting to few of your readers, and which must be as disagreeable to my ownself as to those whose names I may be called upon to use. But I cannot decline the Rev. D. Ewart's challenge without being exceedingly uncourteous to him. He thinks it is not "the fairest way to get rid of an opponent to make an unfounded charge of ungenerous or unchristian conduct, and then back out of the lists *for decency's sake.*" "The Rev. K. M. Banerjea," he adds "is not the first controversialist who has left open a loop-hole for escape in this way." Under these provocations I cannot "back out," and your publication of this challenge is my only apology for troubling you with the following lines.

Now that Mr. Ewart disclaims in his own name any intention of using offensive language, I must retract my charge against P. But as I had never for a moment attributed to him, or any of his colleagues, the paternity of that annonymous letter, and had suspected P. to be some questionable friend who was but superficially informed on the subject, Mr. Ewart's "reputation for fair dealing" could not serve as my guide in the interpretation of his voice from behind the curtain. His words were certainly unguarded, if not offensive, as I then felt. To charge a sentient creature with "*distinctly* conveying an impression" clean contrary to facts, was an accusation which could hardly allow him any credit for honesty; and in the face of such an accusation, I could not *for decency's sake* continue in the lists with an annonymous antagonist. Had Mr. Ewart's proper signature been affixed to the letter, it might have enabled me to put a different construction on his words, notwithstanding their natural and obvious signification. I would then, perhaps, be driven to the conclusion that as my friend

could not charge me with a deliberate and wilful falsehood, he had only conceived me to be an unwitting, and as it were a MECHANICAL *conveyor of a "distinct"* FALSE *impression,* for which, *morally,* I could not be any more responsible than the atmosphere for conducting the lightning's flash to objects attracting it. But the mask had not then been thrown off, and I could not discern the kindly visage of a friend in the person of P. That visage I now see, and will not rudely leave him in the field "unopposed and alone," but will stand before his face as long as he wishes.

Mr. Ewart enters into an elaborate exposition of the terms "morally impossible." If in his estimation the *impressions* of others could afford *greater* presumptive evidence concerning the history of a person's *mental process,* than that person's own recollections, I would not begrudge him the liberty of thinking so for himself; but his jeering reflections against "universal Bishops, Œcumenical or General Councils," are quite irrelevant so far as this discussion is concerned. I never believed or insinuated that these were *infallible,* and it was quite unnecessary, and therefore somewhat uncourteous, if not irreverend, to force their names into this controversy. But let that pass.

Mr. Ewart labours much to shew, that as the Rev. Dr. Duff had all along expected I should join *his* denomination, and as the event proved otherwise, his erroneous impressions demonstrate a want of candour on my part, as if he could not be mistaken unless I were culpable in my dealings with him. Greatly as I revere this honoured missionary, I can neither comprehend nor assent to the logic whereby his apologist would turn me into his scapegoat.

That Dr. Duff entertained any sanguine expectations of this kind, I could never have known, unless Mr. Ewart had authoritatively assured me; and I never thought that my revered friend stood in need of a victim to bear the burden of his mistakes: for the following circumstances which were more or less known to all that were interested in the case, might have easily demonstrated that the chances of my turning presbyterian were not greater than those of my becoming what I subsequently proved to be. Dr. Duff, entitled as he unquestionably is to my most grateful regards, was not, however, the only person the benefit of whose advice and instruction I had the happiness to enjoy. Not a few laymen of the Episcopal Church had stepped forward to lead me, under God, to the truth. Indeed, it was while spending two or three days in sight of the mighty ocean, with a few *episcopalian* friends, that I was first led by God's grace to entertain a serious inclination to embrace Christianity. To one of these friends I considered myself so much indebted that I have ever looked upon him as a father in Christ, and he has not disdained to acknowledge those whom my own exertions, weak as they are, may have since been instrumental in bringing to God, as his *grandchildren.* The name of this gentleman it may be a breach of etiquette publicly to mention in a controversial correspondence. It may, however, be easily collected from the memoir published in your October number, and I am prepared to give every satisfaction to Mr. Ewart *privately* on this point. This circumstance alone might have neutralized the expectation and "obscured the impression," which my acquaintance with Dr. Duff might otherwise have created of my *naturally,* and *as a matter of course,* becoming presbyterian.

Again, Providence had brought me into connection with the Church Missionary Society *before* I was baptized, and although this connection could not deter me from my purpose of receiving baptism at *the hands of the minister with whom I was most intimate, it might naturally* indispose me to identifiy myself, without due enquiry, with the presbyterian *denomination*; and unless it could be proved that I ever expressed a decided predilection for presbyterianism, it would be cruel to hold me responsible for Dr. Duff's mistaken impressions.

Once more, the fact of my attending an English Church on Sundays in the mornings, could hardly be unknown to Dr. Duff. At any rate he must have missed me in his own Church in the fore-noons. I ask then whether this conduct too on my part (which by the way could not be concealed, much less *carefully* concealed) was not calculated to raise suspicions in his mind that I might as possibly join the episcopal church as the presbyterian denomination. I beseech Mr. Ewart to pause and consider here whether the facts I have mentioned do not afford a sufficient reply to the qaestion he has put as if it were an incontrovertible proof of my disingenuousness; "*how could my friend know or suspect any such unlikely state of mind* (i. e. my unwillingness to become a Presbyterian) *unless he had been candidly told, as he ought to have been, that it existed.*" Might not Dr. Duff's expectations or impressions in the face of these facts, and in the absence of any confession favourable to his denomination, be attributed to his own views and wishes, rather than to a *careful concealment* of truths on my part ?

Mr. Ewart calls for the help of an *argumentum ad hominem* by supposing the case of a Hindu receiving baptism at my own hands, and asks if this circumstance, in the absence of any intimation to the contrary, would not naturally produce a distinct impression in my mind that the new Christian wished to become an episcopalian. But his supposed case is not parallel to the subject of our controversy, and the home-thrust is quite powerless. In order to make the cases parallel, it would be necessary to add many other hypothetical premises, such, for instance, as that the supposed convert was intimate with and under spiritual obligations to several presbyterian or independent laymen; that he was already in the employment of a presbyterian or an independant society, and consequently had more frequent occasions of associating with dissenters than churchmen,—that he was in the habit of attending St. Andrews or the Union Chapel in the mornings on Sundays. These hypotheses being premised in the case of the convert supposed by Mr. Ewart, I confess I could not, humanly speaking, calculate *as a matter of course* that he would turn episcopalian, though baptized by myself. The chances of his becoming otherwise would be quite as great, and if I still indulged any expectation to see him return to the unity of the Church as we believed it, my hope would only be proportional to my conviction of the divine right of episcopacy. I might hope that the force of truth would overpower all other obstacles. But if, notwithstanding my *impression*, the event proved otherwise, I could not surely complain that the convert had behaved either uncourteously or uncandidly, or that he had "distinctly conveyed" that impression and afterwards abused my confidence.

With reference to the conversation which had taken place between Dr. Duff and myself on the day the Bishop preached his first sermon in the Old Church, and when I had confessed to him the edification I had felt by the sacrament, Mr. Ewart says, *Dr. Duff must have understood me to mean that I had been edified by hearing the communion service read from the liturgy; or, that having been present during the celebration of the Lord's Supper, I was edified by witnessing the observance thereof!*—If Mr. Ewart advisedly speaks as to Dr. Duff's ignorance of my reception of the sacrament from episcopalian ministers, I cannot call it in question; but I cannot divest my mind of the impression that I had spoken *clearly* on the subject, and that Dr. Duff's subsequent remarks against indiscriminately communing any where and every where, referred to my reception that day of the blessed sacrament in the Old Church. The construction which Mr. Ewart supposes his friend must have put upon my words, I could never have discovered myself, nor have I ever heard of a person confessing himself *edified by the communion* without referring to the *actual participation of the blessed Eucharist.* But now that your correspondent denies, upon Dr. Duff's own authority, his knowledge of this fact, I must suppose that there existed a misconception. I cannot, however, see how this conception must or can be justly charged upon me. Surely I did not equivocate when I confessed myself edified by the *communion*, and when I had a "distinct impression" that Dr. Duff not only understood my language but also threw out hints in order to dissuade me from continuing to receive the sacrament in the Old Church. Your correspondent is fond of insinuating that I acted uncandidly in the affair, and boldly repeats my "conveying a distinct impression" to the contrary of facts. I ask, if after what I had said and done I could still be obnoxious to this charge. How could I justly be held responsible for another man's *erroneous impressions*, unless it were shown that I had produced or connived at them myself? To say that I had, as it were MECHANICALLY, "*conveyed*" those impressions is at best a gratuitous assertion that can only throw dust into the reader's eyes.—Dr. Duff's mistaken notions of my Presbyterian predilections might proceed from his kind feelings towards an unworthy convert, and from his belief that *his* was the best mode of Church Government, but from my attendance in an English church regularly every week, he might easily have suspected that I was not more partial to *his* than to the episcopal discipline.

With reference to the reasons which induced me to ask for baptism in Dr. Duff's house, Mr. Ewart is pleased to distinguish one by calling it "*the leading*," and charges me with having withheld this *leading one* from Dr. Duff. To all this I can only say that both were important, though in different respects. Your correspondent here forces me to state many things which I would otherwise consign to eternal oblivion. For some months before my baptism a want of amity had been very apparent between the Presbyterians and some leading Episcopalians. The baptism of my late friend Mohesh Chunder Ghose, in the Old Church, had given offence to the former and had been severely animadverted upon in the *Calcutta Christian Observer*. Dr. Duff had also dispatched an angry letter in answer to the invitation which Mohesh had sent him to witness the ceremony. The ill feeling that existed was

very great, though I do not presume to say where the fault lay. Under these painful circumstances, sober friends advised that I should apply for baptism to some clergyman who might not have been implicated in the controversy. But as Dr. Duff was the only *minister* with whom I was then at all intimate, and as his lecture room appeared a very appropriate scene for me to testify to the truth before my own countrymen, I was confirmed in my previous determination to ask for baptism in his own house rather than in St. Andrew's. My mind had no leaning at that time for or against Episcopacy or Presbyterianism, and, having had friends in members of both denominations, I did not wish, before enquiry and investigation, to identify myself with either, as a matter of course. This unwillingness was sufficiently evidenced by my attendance in both churches alternately, and I had a " distinct impression" that my English and Scotch friends equally knew that I was in a *strait*. If I did not tell Dr. Duff my absolute unwillingness to be baptized in his *church*, and open the reasons thereof, it was with a view to heal and not to widen the breaches which I had long painfully observed between certain members of the English and Scotch churches. I had not, and, indeed, could not have any other object in passing over this question, than peace and harmony;—and as I never *studied any reserve* but merely avoided an unnecessary introduction of subjects on which hot debates might ensue, the impartial reader will judge how far I am liable to the charge which your correspondent has over and over insinuated, that I had acted in a clandestine and underhand way. He says that my "*chief* reason" (I never called it *chief* myself—Mr. Ewart is pleased to call it so himself) was "*kept in reserve* for an Autobiography or some such occasion." This insinuates a great deal. I can, however, assure him, and your talented predecessor can testify, that very little credit for the " Autobiography" is due to me. The late editor of your Journal, who and whose brother (Capt. Corbyn) had not a little hand, under God, in my conversion, requested *of his own accord* that I should send him a short account of my life. I furnished him with certain rough memoranda in great haste, without reading over even for once what I had written, or expecting that he would print the entire memoranda. Under these circumstances, I could have little *design* in the publication of the Autobiography*.

* Not a few typographical errors have crept into the " Autobiography" and my subsequent letter. In some instances the meaning has been obscured in the former. One slight unguarded expression must, however, be noticed, since that has perhaps misled Mr. Ewart a little. " He had at this period been satisfied that episcopacy was THE form, &c." is not to be considered as connected with the preceding sentence.—What I had written in my memoranda in the first person, or how I had divided the paragraphs, I do not remember.—But I have a distinct recollection that when I declined to join the Presbyterian communion I had no stronger views on Episcopacy than that it was the safest. In an ordination held in the Cathedral shortly before, I had noticed that the Church of England had something of *congregationalism* and *Presbyterianism* as well as of *episcopacy* in its services. I had observed the *congregation* called upon to testify, if they knew any thing, against the ministers elect;—after which a *presbytery* laid their hands on them with the Bishop. From this I concluded that while the English church would be right even upon the Presbyterian theory, the Scottish establishment could not be so upon the episcopal hypothesis. I considered it *safest* therefore, to adhere to the English Church, and declined to communicate with the Presbyterians.

Mr. Ewart wonders that "eight years ago he could not, after making diligent enquiry, find out the grounds of argument" on which I was induced to join the Episcopal Church. *I* do not, however, wonder at the unsuccessful result of his investigation. For though set on a "diligent inquiry," he never thought of writing a line to or asking a question of the "convert" in whose case he was so much interested. Had he enquired of the "Convert" himself, he might have easily attained the object of his "diligent enquiry."

Mr. Ewart seems to take it for granted that Dr. Duff never knew of my reserving church government as an open question, before, at, and for some time after, my baptism. If he speaks advisedly, I must believe him. But I have a "distinct impression" in my mind that I often conversed with Dr. Duff on the subject, and stated to him the grounds on which I had heard episcopacy defended; confessing myself meanwhile to be in a *strait* between two. It was on such occasions that I understood from his own lips, what afterwards I read in Campbell, that the Presbyterians supposed Timothy and Titus to be extraordinary ministers, and the angels of the seven Asiatic Churches to be mere *pro tem* presidents; and that they laid great stress upon the use of the word Bishop in the New Testament, especially in passages like Phil. i. 1. I never asked, indeed, for a formal discourse on church government either from him or any episcopalian friend, but I collected and considered in my own mind what appeared in the course of conversation (not *consideration* as your late printer had made it) and what I met with in books.

With reference to my commencing the study of Principal Hill's lectures with Dr. Duff, it was with a view to the *general* theology it contained, and not to the *particular* question of church government. If, in Dr. Duff's intention, this book was calculated gradually to initiate me into Presbyterianism, it was indeed a *tacit reserve* on his part; for he never told me so. Indeed, not having gone beyond the second volume, I did not know that Hill touched the question of church government at all. Not that I would refuse to go through these lectures if I were aware of their Presbyterian peculiarities, but if I placed myself, under Presbyterian tuition on the subject of Church government, I should consider myself bound in courtesy formally to seek episcopalian instructions too. But I did not for many days know that Hill had touched this question at all; it was an episcopalian minister that first told me that the third volume contained a brief allusion to it.

I will not try your patience any longer, Mr. Editor, and will only say in conclusion that though I have been obliged by Mr. Ewart's challenge, to speak of Dr. Duff rather freely, yet this is by no means consonant to my personal feelings toward him. For him, individually, I entertain the highest regard and esteem; I consider myself to be under no common obligations to him; though of his *denomination* I am not and never was an advocate. Moral necessity is my only apology for writing of him controversially. I had all along studied to avoid this disagreeable predicament, but Mr. Ewart has pressed me with such ill-judged boldness, and spoken with such confidence of matters which transpired in his absence, that

I could not abstain from making these statements without dereliction of a public duty.

I am,

Your obedient servant,

K. M. BANERJEA.

Cornwallis Square,
April 5th, 1843.

Reversing Machine.—A desideratum.

To the Editor of the India Review.

Sir,

As an old subscriber to the Review, I am induced to trouble you on a subject in which I am personally anxious, and trust that you will pardon my doing so, as I will endeavour to make my request as briefly as possible. I am occasionally led to indulge a penchant for sketching from nature, and afterwards putting the drawing on stone. The process by which I effect this is tedious and not always very satisfactory. My first attempts with a Pentagraph were, as you will suppose, the very reverse of what I wished or intended to produce on the stone, although, as drawings, perfectly correct.

It has occurred to me that this instrument might in some way be modified so as to copy the drawing, and at the same time reverse it, which is essential in order to secure impressions from the stone similar to the original drawings.

I am not mechanical myself, and throw out the suggestion that, if the thing be practicable, some of your correspondents may turn it over in their minds and possibly effect the object I desire. I am not the only one to whom this improvement would be acceptable. A little time back I had some conversation with one of your city professional Lithographers, who assured me that such an instrument would be a very acceptable gift.

If you will have the kindness to put my wish in the form of a query, and insert it in your next number, it will greatly oblige,

Your well wisher,

An Amateur Lithographer.

[We readily give insertion to the preceding letter in the hope that some lover of the cause may be induced to cudgel his brains for the benefit of the writer or others whom it may concern. We had, ourselves, intended to point out to his notice, in this number, an instrument by which the object he aims at might possibly be attained. A little accident has prevented this, but in our next we shall insert it. In the meantime we shall be happy to receive any communication on the subject which the ingenuity of our readers may enable them to furnish. It is a very interesting mechanical problem, and may serve to exercise, in a very profitable way, the inventive faculties of our friends.]—Ed.

The Benevolent Institution.

The twenty-fourth Report of the Benevolent Institution for the Instruction of Indigent Christian Children, instituted December, 1809.

As this institution does not appear to be so generally known and appreciated as it deserves, we deem it at once a duty and a privilege to commend it to the attention of our readers.

Simple, but sublime, is the representation given of the ancient patriarch by the pen of inspiration, when of him it is said, that "he, being dead, yet speaketh." Brief, but singularly pregnant expression! As with the glance of intuition it seizes, and with the unerring precision of a divine pencil, it pictures forth the self-perpetuating and never dying influence of the good and righteous of every age and clime. They, "being dead, yet speak;"—through the cycles of all time and to the men of all generations, they continue to speak by their recorded sayings, their devoted examples, and the surviving monuments of their industry and benevolence.

Among all the good and the righteous who have adorned and enriched this land of ignorance, superstition, and misery, we know of none, of whom it can with greater truth be said, that, "being dead, they yet speak," than of the founders of the Serampore Mission—the ever memorable triumvirate, Ward, Marshman, and Carey. Through a thousand channels, and in a thousand directions, their influence is yet felt,—felt, at home and abroad,—felt, where it is unnoticed, unacknowledged, or even unknown to those who are its subjects. But it is not our present purpose to descant on the rare—the transcendant merits of these honoured men. Our object simply is to point to the Benevolent Institution, and to remark that, projected and established as it was through their enlightened and philanthropic zeal, through *it* they are yet emphatically speaking to us.

Having observed that in a great metropolis, like Calcutta, there were numbers of children, whose parents bore the Christian name, and who yet, in consequence of poverty and other depressing circumstances, were wholly unblessed by the means of instruction or amelioration of any kind, they resolved to provide such remedy as lay within their reach. An Educational Seminary, on the Lancasterian system, was planned; an appeal was made to the liberality of a benevolent public; a piece of ground was purchased in the Bow Bazar; and a large and commodious school speedily erected. While reading and writing were to be taught, and, through these, the elements of general and useful knowledge to be communicated, the grand design was to inculcate the principles, the facts, and the doctrines of Christianity—as embodying in itself, not only the purest, but the only true morality—not only the sublimest, but the only true faith. Through such powerful and divinely appointed agency, the ultimate end was, to arrest the progress of demoralization,—to reclaim hundreds and thousands from the wide-yawning gulph of ignorance, depravity, and death—and swell the number of peaceful citizens, loyal subjects, and consistent Christians.

But, though the *primary* object of the Institution was to rescue from ruin the children of poor and destitute professors of the name of Jesus, its advantages were freely proferred to the poor, the ignorant, and the needy of every tribe. Accordingly, in point of fact, it has always been the case, that native children of different oriental races, have attended as pupils. In the present report, we find a goodly assemblage of this motly description—an earnest, we trust, of those better times, when all the disjointed and scattered members of the race of man shall be re-united in one happy and harmonious brotherhood. It is interesting to mark the composition of the chequered group that daily assembles within the walls of the Benevolent Institution. Here they are.—In the Boys' Department; Roman Catholics, 83; Protestants, 52; Hindus, 118; Muhammadans, 32; Burmese, 5; Mugs, 7; Armenians, 3; Jews, 3;—in all, 303. Besides these, we find in the Girls' Department, in which needle work, knitting, &c., are taught,—Roman Catholics, 60; Protestants, 55; Chinese, 9; Armenians, 1;—in all, 125. Thus the entire number of boys and girls of different and widely divided races, who receive a sound and wholesome Christian Education, amounts to 428. To the praise, also, and credit of the philanthropic founders and managers of the Institution, it must be added, that no sectarian peculiarities are inculcated as an integral part of the educational course—that the great text book of faith and practice is the Bible,—the infallible word of the living God—and that harmony and love pervade the entire scheme of instruction and the entire course of discipline.

An Institution of a character so truly catholic, and one whose utility is so obtrusively palpable, even to the most inconsiderate, ought to command general and liberal support. The Government, greatly to its honour, has for many years contributed 200 rupees per month to the funds; the public have not been forgetful or niggardly;—still, much more might be done, and, let us hope, shall be done, by a generous and discriminating community. So far back as 1824, Mr. Lushington, of the Bengal Civil Service, declared, on credible evidence, "that there were then in this city, in the interior of the country and the Eastern Isles, more than a *thousand* youths, who, rescued from vice and ignorance by this Institution, were advancing in usefulness to society, while, gradually though slowly, rising to a certain degree of opulence and respectability." If such was, as we have no doubt it was, a veritable statement of the amount of good achieved twenty years ago, how much larger must the aggregate be now! We are thus fully prepared for the following strong representation which we extract from the present report:—

"The Benevolent Institution almost exclusively seems to be the school for the many poor, almost homeless wanderers of the streets of Calcutta. It is necessary only to pass through some of the numerous lanes in the vicinity of Bow-Bazar, to learn of what real use, and to what an extent this Institution is a blessing to the rising generation of Calcutta. It is a fact calling for the deepest gratitude to God, and containing much to satisfy and please the religious public, that many girls and boys, of all ages, who would otherwise become, from the very nature of the circle in which they move, pests to society, sources of endless grief to their parents,—or, poor destitute orphans, would spend their days and years in indolence and sin, and end them in shame and ruin,—are, through the education imparted in this School, made not only useful in the world, and blessings to their neighbours, but rendered capable of earning a comfortable livelihood and filling respectable situations. There are not a few in this country,

now in prosperous circumstances, who owe their every thing to the training they received here; and, as the doors of useful employment are daily more numerous and open, so there are annually a considerable number of the pupils launched out into life, improved in every sense, and deserving all encouragement."

The writer of the present notice, being wholly unconnected with the religious denomination of the founders and managers of the Institution, cannot be accused of undue partiality, when, after a period of at least twelve years, during which he has enjoyed many opportunities of watching its operations, he can honestly testify to the faithfulness of the above portraiture of its practical effects and manifold blessings. The name of Mr. Penney, the late superintendent, is fondly cherished in the memory, and deeply graven on the hearts of hundreds, who gratefully regard him as their greatest benefactor—their father—and their friend. And those who know Mr. Evans, the present superintendent, have good reason to behold in him, one, on whom the mantle of his honoured predecessor appears to have fallen. But, while awarding due credit to the superintendents of the Boys' department, it would be ungenerous and unjust to pass by the great and praiseworthy exertions of the superintendents of the girls department. Mrs. Penney was truly a mother, as well as an instructress, to her numerous flock. And what Mrs. Penney was before, Mrs. Evans is now. More, it is not necessary to say, lest retiring and unaffected Christian modesty might be offended; less, we could not say, in justice to the claims of the institution on public support. For, next to the importance, and excellence of the object itself, in stimulating to the exercise of enlarged liberality, must be the confidence which the public at large is warranted to repose in the character of those who are appointed to carry it into execution. In the present instance, the greatness of the object, in a moral and social point of view can scarcely be overrated; while confidence in the executors may well be unqualified. Let the hearts of the benevolent, therefore, be opened; and their liberality increased. And let them resolve that an institution, which has been already so greatly blessed, may be perpetuated as a fountain of blessings to latest generations.

Report of the Bombay Chamber of Commerce for the Second Quarter of 1842-43.

The principal feature in this Report is the Memorial of the Chamber to the Board of Control on the subject of the abrupt variations in the rate of exchange between India and England, which is effected by the financial operations of the Court of Directors and the Local Governments.

The expences of the home establishment of the East India Company, amounting to about £3,200,000, are of course defrayed out of the revenues of this country. To obtain this sum, the Court of Directors may either sell in London for money their drafts on the local governments, or may cause the local governments to send home to them bills on the merchants of London. The exportation of bullion from India to any thing like the amount required is quite out of the question, as it would drain the country of currency, and render impossible the collection of

the revenue. Hence we are thrown back on the two courses previously suggested :—the purchase of Bills on London in India, and the sale of Bills on India in London. The latter is an operation sufficiently simple, and it is to the former that the attention of the Bombay merchant, has been principally directed. The manner in which they, and other merchants of British India, are unfavourably affected by the operations of the government is as follows:—The governments requiring Bills on London, have them drawn against produce hypothecated to themselves on account of advances made. As long as the government is eager to remit, it is content with the par of exchange, that is, it is content to receive in London the same quantity of precious metal in the form of currency as it disbursed in advances in India. It is sometimes content with even less. But, as soon as the demand has been supplied, up goes the *nurrick*, or rate of exchange, that is, the government wants in London more silver, or its equivalent, than it gives in India. Now if this took place gradually and almost imperceptibly, as it might if the immense operation for the exigencies of home government were effected by many individuals, no harm would be done to the mercantile body. But the local government proceeds hastily and abruptly after it has satisfied its own wants to take itself out of the position of being applied to for farther advances, by all at once raising the exchange to a rate so high that the Treasury may be considered closed. Again, when its exigencies are not immediately satisfied, the rate is reduced 4 or even, we believe, 8 per cent at a time, and with as unfavourable an effect to monetary stability. For instance, the agent here who has sold his correspondents goods at a little above the limit fixed, and has formed expectations of giving the greatest satisfaction to the house at home, suddenly finds himself by one of these abrupt transitions to a lower rate not able to remit within 4 per cent of the limit. And this is most serious when we consider the low rate of profit at which goods exported from England are allowed by their consignors to be sold. It is also known that much private distress is occasioned to families in receipt of remittances from India, whose representatives here are not entitled to the advantages allowed by government to some of its servants to enable them more easily to support their offspring at home.

We do not consider it necessary to append the memorial to which these remarks refer, we are nevertheless induced to add an extract from a letter addressed by the Secretary of the Chamber to the Secretary of the London East India and China Association, setting forth in very clear terms the nature and extent of the evils which it is the object of the Chamber to remove or lessen,—

"It is not difficult to perceive how enormous is the power at present possessed by the Court of Directors, who, from being allowed to enter the exchange market, and purchase bills for the amount required for their Home remittances, are placed, in such matters, on an equal footing with the private merchant. So large is the amount in question, that the rate of exhange fixed by them—if it do not bring all mercantile exchanges to it's own level—certainly affects them in a serious degree; and this influence is so severely felt, that an impression has long generally prevailed, that in obtaining the sum annually remitted home, the Indian Government ought, in fairness, to restrict themselves to the sale in England of their bills on the Indian Treasuries. Such a change as this, perhaps, can hardly at the present time be expected to take place; but there can be no doubt as to the claim which the merchants have for some protection against the undue exercise of the vast power vested in the Court. The merchant may watch

with unwearied attention every fluctuation in the money market—he may calculate probable alterations with the greatest nicety—and he may devise with unerring sagacity his own monetary plans; but if a party exist, which possesses, from the magnitude of it's operations, the power of fixing in a moment the rate of exchange for all India; which can enter, without intimation, into the Exchange market; and whose financial designs are involved in impenetrable mystery—totally opposed to mercantile interests—based upon no principle—and guided by no apparent rule;—he obviously acts without the slightest assurance that his most careful calculations, and prudent schemes, may not at any time be destroyed and rendered of no avail, by some arbitrary announcement.

It is with the view of correcting the evils of this unjust system, and of obtaining for the merchant the adoption of some permanent Rule, by which the Court may be restrained in future from abrupt and capricious alterations of their rates of Exchange, that the Chamber has now addressed the Board of Control."

The Chambor has also addressed to the Bombay Government, a statement of grievances under which the native merchants and traders of the presidency have been suffering. These have been caused, principally, by certain changes in the mode of doing business at the Custom House:—the complicated details of these new Laws and Regulations, but little understood by the native subjects, have caused considerable annoyance and pecuniary loss, evils by which it would appear the European merchant stands but little affected. A short extract will show that these complaints are not without foundation:—

"It appears that on the exportation from Bombay of articles imported from all countries except Great Britain, proof is required to be given of the payment of import duty; and this rule, now invariably enforced, acts in a manner extremely detrimental to Native Traders, who, destitute of the facilities possessed by the European merchant, and exposed to numerous hindrances and annoyances which the latter never feels, are peculiarly the sufferers by any fresh complication of details, at no time well understood by them. The shipments made by Native Merchants are frequently composed of several different descriptions of goods, purchased of many different parties; and when this is the case, the loss of time that must result, from the necessity of obtaining from each of these parties a certificate of payment of import Duty, before the goods can be shipped, may be easily imagined. The Committee would submit that not only is the trouble which thus devolves on the native trader, of an oppressive and injurious character, but after the utmost vigilance has been exercised to prevent the importation of articles without payment of duty, it certainly seems unfair to impose upon him the onerous and in many cases impracticable task of producing, previous to exportation, vouchers to prove that such duty has been paid. All goods on the Island, in the possession of the merchant, might, as in other places, be assumed to have been legally imported, and on their being passed through the Custom House for exportation, any enquiry as to the payment of import duty should be deemed superfluous.

Another grievance of which the native merchants justly complain, is the levying of Export Duty on Iron Nails, Copper utensils, cocoanut oil, and other articles manufactured here, and which have already paid duty on Import in the raw or unfinished state. This matter was brought to the notice of Government on the 11th June last, when the Chamber had the honor of addressing you respecting the revision of the Tariff, and it was stated, in reply, that a reference had been made to the Bengal Government, the result of which, when obtained, would be duly communicated. The committee trust soon to receive some information on the subject, and hope the decision will prove favorable, the native community complaining much of the existing system.

The Committee have also been requested to draw the attention of Government to the fact that goods imported from Madras, Calcutta, and the Malabar Coast, which used to pass free of further duty on the production of a certificate of prepayment, are now unpacked and appraised, and duty is charged on the difference between the valuation of the appraiser and the amount stated in the certificate. The injustice of this system will be rendered obvious, when it is considered, that should the value of the articles appraised prove less at Bombay

than at the place whence they have arrived, no deduction whatever is made from the duty, but the whole amount charged at the latter port is retained. The inconvenience of going twice through all the official forms attendant on the payment of duty on valuation, is in the highest degree vexatious.

I am further directed to state, that articles (such as Rice, Ghee, &c.) intended for consumption during the voyages of Vessels from Port to Port, as well as articles of apparel belonging to the crews of such ships, are at present required to pay export Duty. The trouble of producing certificates on such articles, incurred,—as it generally is—just as the Ship is going to sea, is the main objection to this rule; but, small as the amount of duty may be, the expediency of imposing even such a tax as this on such articles, is, in the opinion of the committee, extremely questionable."

The remaining portions of the Report contain a letter from Captain Ottley A. A., Civil Engineer, Khandeish, on experiments made by his sons in the culture of Cotton, Indigo and Mauritius Sugar Cane, followed by the reply of the Chamber, offering several valuable suggestions on the subjects named.

The concluding article, furnished by Messrs. Thos. Southey and sons, affords some useful information and hints on Indian Sheep: from this we extract the following:—

"A large portion of the covering of Indian Sheep is mere hair, and nearly the whole of the Native fleeces are interspersed with black or grey hairs (arising from many of the flock being party-coloured) this alone is a very great objection to the consumer of the article, as such wool cannot be beneficially applied to the manufacture of any description of goods but those which are either mixtures or dark colours: but when pure white, it can be consumed indiscriminately. We have dilated on this point, to shew the necessity of rejecting all sheep that have not pure white fleeces.

There is another imperfection in the fleeces of Asiatic sheep; they almost invariably abound with what is technically called "*kemp hair*", that is, a bright spiry hair which is not serrated like the hair of wool, consequently, being deprived of that requisite adhesive property, cannot unite, but appear conspicuous in every article wherever consumed, and cause the application of the Wool to be confined to the manufacture of the most common description of Woollen goods; whereas, if the fleeces were divested of the black, grey, or kemp hairs, the wool would be enhanced in value 20 to 25 per cent. Prudence, therefore, dictates that the fleeces of the flocks should be annually examined, and all those which retain the greatest portion of any of the above defects, should be extirpated, or rejected from the establishment.

The same minute attention should also be paid to the selection of sheep when purchased, taking due care to choose those whose fleeces are most free of the above defective qualities.

In conclusion, we beg further to notice, that in the event of English Rams being resorted to for the purpose of ameliorating the fleeces of the Indian flocks, augmenting the weight of their fleeces, and through their instrumentality, of extirpating the fault pointed out in the Indian fleeces, we recommend due care and attention being paid to the quality of the fleeces of the Rams; this has hitherto been very generally disregarded. Orders are usually given for sheep to be purchased of celebrated breeders in a country whose name is familiar from their having succeeded in rearing sheep of perfect symmetry, and such as speedily fatten; this is sought and obtained, without regard to the quality of their fleeces, and which are most commonly of a coarser quality arising from their being higher fed.

We beg to offer the following, attention being paid in selecting the Rams: viz., That the choice should be made in the month of May, or June, just before they are shorn, and a few taken from one flock and a few from another, confining the choice entirely to the age of the Ram and quality of the fleece, of which there is at least 1½d to 2d per lb. difference in the quality in the generality of fleeces.

The India Journal of Medical and Physical Science, for January and February, 1843. Edited by G. Eveleigh, Esq.

We are not medical, or medically inclined, and cannot therefore be expected to say as much of our Medical and Surgical contemporary as we might do if our hours of study had been passed in the society of Hippocrates, Galenus, or Sydenham, or under the tutorship of Hunter, Bell, or Abernethy. Nevertheless we cannot for the first time abroad meet one, who, for six years, was—if not our twin—our foster-brother and companion, without at least a hearty greeting and expression of good will for the continuance and prosperity of his journey in the venture wherein we have, like the brothers in the nursery tale, severally set forth.

Though we cannot talk learnedly in detail, we can at least speak earnestly in general, by expressing our belief that in a country where man seems more than elsewhere, subject to "the thousand natural shocks that flesh is heir to," and where, consequently, every source of information, calculated to throw light on their remedies, or preventives, and every channel of their dissemination, must, to the medical practitioner in particular, be of vital importance, the Journal merits that patronage of subscribers, and support of contributors, which can alone render encouragement to its conductor, or profit to its readers. We heartily wish Dr. Eveleigh both; and are sure that if industry and zeal in the task can ensure their realization, he will not labour in vain either for the public weal or his own credit.

REVIEW.—FOREIGN.

Scottish Association for Promoting the Fine Arts.

Report by the Committee of Management of the Association for the Promotion of the Fine Arts in Scotland for the year 1841-42. *Edinburgh*, 1842.

We have been more or less acquainted with the proceedings of this Association from its first establishment, and have regarded its rise and progress with very deep interest. It is, therefore, with sincere pleasure that we learn from the report before us that it is steadily progressing. It has now been in existence, we should suppose, for eight or ten years, and its funds for each of the three years 1839-40, 40-41 and 41-42 have been considerably above £6,000. When it is considered that £5,282 were last year subscribed in Scotland itself, it will be admitted that the taste for Fine Arts is not wholly dead,—but of this more anon. The mode of operation of the Association is simply this. Every subscriber of a guinea is, for the year of his so subscribing, a member of the Association. A Committee of fifteen members is annually chosen, at whose disposal the funds of the Association are placed. These funds (with the deduction of the necessary expenses, and a reserve to which we shall immediately allude) are expended in the purchase of pictures from the exhibition of the Royal Scottish Academy. The pictures are ballotted for by the members of the Association, and become the pro-

perty of the successful ticket-holders. As the rate of subscription for a single share is only a guinea, and as many of the pictures are bought at a high price, it is evident that many of the members must draw blanks from the ballot-box, and in order to console these for the sacrifice of their guineas, the committee are empowered, if they think proper, and we believe it has now become virtually a standing rule that they always shall think proper, to reserve a portion of their funds for engraving some approved picture and presenting a copy of the engraving to each member. A holder of a single share receives a print, one of two shares a proof, of five shares a proof before letters. These engravings, if published by a printseller, would cost more than the whole amount of subscription; and so it is impossible for any one to be a loser by becoming a member of the Association.

In the year to which the Report before us refers, the Committee expended £4,464 on 139 paintings, of which five are classed as historical, 31 as imaginative, 99 landscape, and four animal and still life. For an historical painting was given £250, and for each of two others £200, for two landscapes £130 and £120 respectively, and for a historical piece and a landscape £100 each; the other pictures are at various prices from £100 down to £5. In addition to these paintings distributed by ballot each member is entitled to a copy of an engraving from an admirable picture by Sir William Allen, entitled "Heroism and Humanity" and illustrative of the following incident in the life of the Royal Hero of Bannockburn.

"One morning, when the English, and their Irish auxiliaries, were pressing hard upon Bruce, who had given his army orders to continue a hasty retreat,—for a battle with a much more numerous army, and in the midst of a country which favoured his enemies, would have been extremely imprudent,—on a sudden, just as King Robert was about to mount his horse, he heard a woman shrieking in despair. 'What is the matter?' said the King; and he was informed by his attendants that a poor woman, a laundress or washerwoman, mother of an infant who had been just born, was about to be left behind the army, as being too weak to travel. The mother was shrieking for fear of falling into the hands of the Irish, who were accounted very cruel, and there were no carriages nor means of sending the woman and her infant on in safety. They must needs be abandoned if the army retreated.

"King Robert was silent for a moment when he heard this story, being divided betwixt the feelings of humanity, occasioned by the poor woman's distress, and the danger to which a halt would expose his army. At last he looked round on his officers with eyes which kindled like fire. 'Ah! gentlemen, never let it be said that a man who was born of a woman, and nursed by a woman's tenderness, should leave a mother and an infant to the mercy of barbarians. *In the name of God, let the odds and the risk be what they will, I will fight Edmund Butler rather than leave these poor creatures behind.* Let the army, therefore, draw up in line of battle, instead of retreating.'"

We have just seen this engraving and can confidently declare that no one can see it without admiring it. We do not know any painter that bestows more labour upon his pictures than Sir William Allen; and judging from the engraving, for the execution of which Mr. Burnet is entitled to very great credit, we should suppose this very far from being

one of his least successful efforts. If we were disposed to be critical we should say that the mother is perhaps somewhat too fine, too lady-like, too attractive. The value, so to speak, of the humanity is just in proportion to the purity and unmixedness of its motive. There were multitudes we doubt not in those days of chivalry who would have done much for the protection of an "exceeding fair damsel," or of a "dame of high degree," but the glory of the action of Bruce consists in its having been performed in the behalf of a "knavish woman," one whom most of the nobles of the time would have esteemed unworthy of a moment's regard. It was this that marked him as in advance of his age in recognizing the claims of "humanity,"—the claims of every human being, upon every one who has been

> "—Born of woman and drawn milk
> As sweet as charity from human breasts."

Now we apprehend that this would have been more forcibly brought out had the woman whom he relieved been less endued with other attractions besides those of mere distress than the painter has represented her. Moreover, we question as to the historical accuracy of the representation. We are not much acquainted with armies and camp and camp-followers, but we do not believe that the washerwomen who follow an army are generally so lady-like women as Sir W. has represented the heroine of his piece, and if this be so now, it must have been much more so five centuries ago. But it is altogether apart from our design to enter into any criticism on these engravings, the production and distribution of which is one of the smallest parts of the operations of the Association. However, when we are upon this subject we may mention that we have just seen four besides the one that we have referred to*. They are all excellent in their several kinds; they are "the examination of Shakespeare before Sir Thomas de Lucy," "the cast away,"—"the moment of victory," and a highland landscape. The Report mentions that the subscribers of the present year, 1842-43, are to receive an engraving by Mr. W. Miller, after a painting by Mr. Lauder, and from our knowledge of the powers of these two artists we should expect the engraving to be very excellent.

We cannot but look upon such an association as this, as likely to produce a great revolution for the better in regard to the fine arts. It circulates the best productions of the pencil and the brain among those who are otherwise virtually excluded from the sight of them, or see them merely on the occasion of a hurried annual visit to an exhibition, when their minds are so distracted by the vast multitude of pictures, that they cannot fix their attention upon any one or any small number, so as in any degree to improve their taste or knowledge of the principles of the art by their careful and leisurely study. We believe that a mere inspection of a gallery of paintings is fitted rather to confuse the ideas of a comparatively inexperienced spectator than to infuse into his mind any correct notions of the principles of art. Who does not remember the weariness and exhaustion of mind and confusion of ideas that were occasioned by his first visit to a cotton mill

* These are in the possession of Mr. Lamb, honorary secretary of the Association for Calcutta, and may be seen at his house in Esplanade Row. We may also inform our readers that the rate of subscription in this country is eleven Rupees per annum.

or any other large factory?—Now we apprehend, that a very similar feeling is produced in the mind of one who visits an exhibition of paintings, and has a large collection of works of art presented to his mind all at once, before he has had opportunities of examining, and having his attention specially directed to, individual pictures which he could examine at leisure, and without the presence of multitudes of others to attract his eye and distract his attention; before he has had an opportunity, so to speak, of studying the subject in the model. Taste is like every other of the mental faculties, it must be trained and developed by degrees: now we advocate such an association as this just because we believe that by making excellent pictures the property of families who could never otherwise have aspired to their possession or to more than one passing and unstedfast look at them in the course of a hurried survey of the walls of an exhibition-room; and so by familiarising the members of these families with the beautiful in taste and the elegant in art, it is adopting one of the best methods of developing and calling forth a most important faculty, that otherwise should have been destined to lie dormant and inoperative in the souls of multitudes.

The present report furnishes an instance exactly in point for the illustration of our meaning. It appears that the £250 picture has become the property of a lady in Newfoundland. Now we may safely presume, without any disparagement to the connoisseurs of that country, that such a painting has never made its appearance on the island before. Now we maintain that its arrival there is an era in the mental and intellectual history, and by necessary consequence in the moral history also of the island. It were an easy matter to trace in fancy its operation in the cases of various individuals, the representatives of so many classes. We might suppose it to come by chance under the notice of some denizen of the island clothed with materials similar to its own, *canvass* covered with *oil* and *colors*, and with a hard-a-weather countenance and a face like that of one of his sagacious compatriots of the canine race,—in one word it may be seen, and we doubt not will often be seen by some hardy fisherman. He may seem to look upon it with an uninterested gaze, or may think it unworthy of more than a passing glance, yet it leaves him not the man it found him; he has imbibed an idea, or notion, or perception that he had not before; that idea, or notion or perception is the idea or notion or perception of "the beautiful," and he goes to his work on the cold iceberg with another mind and other susceptibilities than those with which he went before.

"Ingenuas didicisse fideliter artes
Emollit mores nec sinit esse feros."

Now we say not that our fisherman has *learned* ingenuous arts, but he has got the first lesson, and even that may do something to soften, to elevate his mind and improve his habits and affections.

Again, the picture is seen by a youth whose blood has not yet so often been frozen by the winter's cold, and whose chin has not been decked with the proper "Newfoundland ruff." He sees in it the embodiment of his night and day dreams, the personification of his fond imaginations. He feels in his soul the swellings of conscious genius; his destiny for life is changed. In silence and secret he

labors, conscious that he also has in his soul the idea of that which is beautiful and good, and wondering that he cannot represent outwardly that which he can as little dislodge from his mind. The schoolmen disputed gravely whether 10,000 angels can dance on a needle's point, but with us it is no question at all that 10,000 events in a man's history may hang upon a smaller matter than that about which we are speaking; nor in his own history alone, but in the influence that he may exert upon a small community, who are all willing to acknowledge that he possesses that which they do not possess.

These may be supposed by some to be extreme views, and perhaps they are, but all will acknowledge the principle we mean to educe by these instances. No one will doubt that the sending of a single painting of great excellence into a locality where such works have never been seen before, may have a great influence both in diffusing a taste among the people generally, and fostering in a few those seeds of genius that else might have remained for ever latent. And one great advantage of the plan consists in this, that it accomplishes these objects simultaneously. It is, indeed, scarcely possible to do the first and leave the second undone; but it is very possible to accomplish the second apart from the first. If a taste for the fine arts be generally diffused among a people, the mere principle of the mutual action and reaction upon each other of demand and supply would raise up a body of artists, but it is quite possible to foster into being a race of artists while there is neither demand nor remuneration for their services; and this we apprehend is just one of the reasons why so many have been constrained to wear out their lives in unrequited labor, and go down to early graves the victims of the partial and injudicious application of artificial stimulus to taste and talent. It is then the excellence of such an institution as this, first of all to create a taste throughout the community generally, then to call forth a body of artists to furnish a supply adequate to the demands of this diffused taste, and to enable the demanders, by means of union with each other, to afford that remuneration and encouragement to the suppliers which separately and individually they could not do.

This may be the proper place also to point to a difference in the mode of operation between the Edinburgh Association and a Society called the "Art Union" of London, formed on what was supposed an improved plan. The Edinburgh Association, as we have stated, place their funds in the hands of a Committee of gentlemen, who dispose of them in the purchase of pictures, which are ballotted for by the members. The "Art Union," on the contrary, makes a lottery of the money, and leaves the choice of the pictures to the fortunate shareholders. Now, it is evident to us, as we believe it will be to all who will seriously think of the matter, that such a plan will very materially counteract the objects in view. We venture to assert that in nine cases out of ten the gainers of the large prizes will prefer a number of pictures of inferior merit to one of great excellence; or they have personal friends whom they must encourage, and these friends are perhaps little better than polluters of good canvass. Thus, such a Society may be the means of corrupting taste and encouraging mediocrity, or positive badness in design and execution. By entrusting the purchase of the pictures to a Committee of gentlemen on the

other hand, we do all that can be done for the encouragement of the best artists, and the dissemination of the best works. It may not be out of place to mention that the Edinburgh Association is especially suited for subscribers abroad, as there must be great difficulty connected with the selection of the pictures for such as might gain a money prize as in the London Society. No friend likes to take such a responsibility, and few would like to trust a paid agent.

It will be evident, from what we have said, that we expect the Edinburgh Association to prove as a fostering mother to the fine arts in Scotland and elsewhere. Now, supposing our expectations realized, will the country or will individuals be benefited? Will morality be forwarded or the contrary? Will good or evil be the result. On such points as these we would avoid the extremes that have been fallen into by those who have spoken enthusiastically, and often meaninglessly, on either side of the question. Some have spoken of the fine arts, as we would think it right to speak of nothing but the blessed gospel itself, as if they were the destined renovators of the sin-ruined world; and others, viewing them only as the handmaidens of luxury and effeminacy, have as enthusiastically and as meaninglessly decried them. We can agree with neither. A fine taste may co-exist with extreme moral perversity and turpitude, and so co-existing may render its possessor only the more accomplished and the more successful and the more seductive villain; but then, on the other hand, we are prepared to maintain that the possessor of a refined and cultivated taste, co-existing with moral probity and high principle, will have sources of enjoyment as regards himself, and means of designing and executing measures for the good of others, from which one were excluded with the same probity and principle, and the same outward circumstances, but without the taste or without its cultivation. Some one has truly said, that "a little mind can be but a little virtuous:" and hence we regard every thing that expands the mind, enlarges its faculties, developes and exercises its powers, as encreasing man's capabilities for good. We have indeed a profound regard for the homely virtues of those who

> For their humble sphere by nature fit
> With little understanding and no wit
> Just know, and know no more, their Bible true.

But this is quite compatible with a profounder veneration for those men of enlarged soul and lofty aspirations, who lay all their gifts and endowments as an unworthy offering on the altar of God, and enter the kingdom of Heaven with the simplicity and in the spirit of little children. Amongst a people like the Scotch there is not much danger of the fine arts being prostituted to the service of luxury, effeminacy or vice, as they unquestionably were in the declining days both of Greece and Rome; and therefore we shall hail their diffusion as one of the means of elevating still higher the character of our countrymen, and conspiring with other and higher means for carrying on the great work of human improvement.

SCOTUS.

The Edinburgh New Philosophical Journal. By Professor Jameson, October. 1842.

This number contains a valuable paper on Nebulæ, by M. Arago, extracted from the Historical and Critical Analysis of the Life and Works of Sir W. Herschel in the *Annuaire* for 1842, presented to the king of France by the *Bureau des Longitudes.* As such articles are from their high merit extremely rare, we have given in full the most important parts of the one cited, connecting them by an abridgement of such as would bear condensation.

'*Nebulæ*' is the name given to the *diffused spots* which astronomers have observed in all parts of the heavens. The stars being unequally scattered through the firmament are in certain regions very crowded, and in others of considerable extent are apparently altogether absent. We shall first consider such agglomerations as the Pleiades, the surrounding mass of Argus, the Prœsepe, and others which are local and very circumscribed.

To every short-sighted person, the Pleiades have the appearance of a *confused mass of light*; but when a glass is used, which does not magnify, or the vision is rendered distinct by simple spectacles, the principal stars of this group are seen separately, and become detached, I may say, from one another. The Pleiades, then, are a nebula only to certain observers, and even that only when they do not use spectacles. In the group of Cancer, the different stars being more condensed, the *natural* human vision cannot separate them; the light of one star becomes extended and scattered on the retina, mingles with the light of the neighbouring star, on account of the imperfection of our organs, and the whole forms a confused mass. Avail yourself, on the contrary, of a telescope, even of small power, and the image of each star becomes greatly concentrated, is thus separated from the image of the contiguous star, and the luminous mass loses the character of diffusion, which can only be legitimately maintained in the class of true nebulæ.

But there are luminous spots which we cannot resolve into groups of stars without the aid of the most powerful instruments. The great number which were, however, so resolved by the instruments of Herschel, and which had never yielded to any telescopes but his own, led this great astronomer to a rash generalization. He maintained for many years that *all* nebulæ are masses of stars essentially differing only by a greater or less distance, or greater or less condensation, in stars composing them. Minute and very delicate observations, made in entire good faith, at last induced Herschel to modify his first opinions. In a memoir of 1791, we find the following words. "There are nebulosities (whitenesses) which are not of a starry nature." From that time the non-condensed celestial matter, the celestial matter nearest to the elementary state (if such an expression may be allowed), appeared not less worthy of attention and presented itself to minds imbued with some philosophy as a fruitful source of discoveries.

Nebulæ, even those to which that name is improperly given, or which can be resolved into stars by means of powerful telescopes, present themselves under a great variety of forms. In some cases, they may almost be taken for luminous lines, others opening in the shape of a fan resemble an aigrette diverging from a strongly electrified point. Some of the contours have no regularity, and in some cases we have the appearance of the head and nucleus of a comet. One of Herschel's first objects indeed, was to prevent the wandering comet, even from the time of its first appearance, from being ever confounded with an im-

moveable nebulæ, notwithstanding the apparent resemblance in their physical constitutions, and their great similarity of form. Let us attend to mere detailed definitions.

" *Circular Nebulæ.*—The circular form is that which resolvable nebulæ appear most commonly to assume. Herschel devoted himself to the examination of circular nebulæ in a most particular manner. He has deduced from his observation important results, of which I shall endeavour to give an exact idea.

The circular form is only apparent ; the real form must be globular or spherical. An observation which I shall immediately refer to will render this evident.

In general, the stars of which these nebulæ are composed appear to be very nearly of the same size*. They are distributed around the centre of the figure with perfect regularity. Accordingly, at equal distances from this centre, the luminosity is absolutely equal in all directions.

If we place at a very great distance a spherical nebula, in which the stars are equally condensed in the centre, edges, and throughout, the eye will misrepresent this composition. Let us bring the visual ray which traverses the sphere near the margin. The space comprised between the point of entering and issuing will be very short ; the ray will therefore fall upon very few stars. In proportion as this visual ray approaches the centre, the part comprised in the sphere will become longer, and the number of stars it encounters will go on increasing. The maximum will be observed in the centre itself.

The gradual augmentation of intensity from the margin to the centre presented by all nebulæ apparently circular, may thus be considered as a manifest proof of the globular form of the spherical shape of the starry group.

It is easy to push these considerations further.

We have stated that the parts of the visual rays which are comprised in a sphere, go on increasing in size from the margin to the center. If the sphere is filled with stars equally distant, the length of these parts of the visual rays will be proportioned to the number of stars which the rays touch upon ; they will give *the measure* of the luminous intensity of all the regions of the nebula from the edge to the centre. Well, let us bring nearly parallel lines across a sphere. Near the edge, these lines *will vary in length* rapidly ; near the centre, on the contrary, they *will vary* very little. The nebua ought, therefore, *to vary* in splendour very rapidly at the edges, and scarcely at all in the centre. This is the reverse of what is witnessed. There must be something inaccurate, therefore, in the hypothesis with which we set out ; we must have been wrong in supposing that stars exist in all the parts of the sphere in a state of equal concentration. The rapid augmentation of intensity towards the centre, the presence of a kind of luminous nucleus in the centre itself, prove that the stars are more condensed there, and around it, than in any other place. Such a result is important, at once by its nature and its generality. It ought to be considered as an obvious indication of the existence of a clustering power directed from all parts towards the centre of the globular group.

Number of stars contained in certain globular Nebulæ.—It would be impossible to give a detailed and exact enumeration of the total number of stars of which certain globular nebulæ are composed ; but we may arrive at certain limits. By taking account of the angular spacing of the stars situate near the edges—that is to say, in the region where they do not project one over another, and comparing it with the total diameter of the group, we ascertain that a nebula, whose diameter is about 10 minutes, and whose apparent superficial extent is scarcely equal to a tenth of that of the lunar disc, contains no less than *twenty thousand stars*.

* Although the rule I have prescribed for myself prevents me entering upon memoirs posterior to those of William Herschel, I cannot resist the temptation of bringing forward in this place two curious observations by James Dunlop. This astronomer, during his residence at *Paramatta*, New Holland, remarked, at 11h 29m 20s of right ascension, and 29°16' of southern polar distance, a resolvable nebula of 10' diameter, in which shone three *red* stars and a *yellow* one, displaying these peculiar kinds of light in the midst of a multitude of white stars. On another occasion, his powerful telescope, directed to 18h 49m 5s of right ascension and 53°10' of polar distance, presented a nebula to his view of 3½' diameter, *composed entirely of bluish stars*.

Herschel, on first entering on the study of nebulæ, remarked that they generally form strata. He invariably found that the spaces which precede and follow simple nebulæ, and still more, grouped nebulæ, contain very few stars. He also observed that the spaces poorest in stars are near the richest nebulæ.

"Let us connect these facts with the observation which has shewn that the stars are greatly condensed towards the centre of spherical nebulæ, and with that which has afforded the proof that these stars sensibly obey a certain power of condensation (or clustering power), and we shall feel disposed to admit with Herschel, that nebulæ are sometimes formed by the incessant operation of a great number of ages, at the expense of the scattered stars which originally occupied the surrounding regions; and the existence of empty, or *ravaged* spaces, to use the picturesque expression of the great astronomer, will no longer present anything which ought to confound our imagination.

Nebulous matter, as distinguished from resolvable nebulæ, occupies very extensive spaces in the heavens. The superficial extent of 52 nebulæ in Herschel's catalogue of 1811 occupies about the 270th part of the number of circles of one degree in diameter to be found in the whole surface of the firmament. But the great luminous spots possess no regular forms : in fact, all the fantastic figures assumed by clouds carried along and agitated by violent and often contrary winds, are found repeated in the firmament of diffused nebulæ. Amongst those of smaller dimensions, and of a rounded, distinct, well circumscribed form, there sometimes exists a very slender thread of nebulosity attaching them together by their circumferences; one might almost call it a kind of index to their common origin.

The nebulæ composed of a diffused continuous phosphorescent matter have, in regard to their *light*, a peculiar and indefinable aspect, with which the early telescopic observers appears to have been particularly struck. Halley says, of the light of the nebulæ of Orion and Androméda, "in reality these spots are nothing else but the light coming from an extraordinarily great space in the éther, through which a lucid medium is diffused that shines with its own proper lustre." Derham says that the light of nebulæ could not be that a congregation of stars,and asks if, as Anaxagiras, Seneca and others formerly believed, there may not exist beyond the sphere of the remoted stars, a region entirely luminous, an empyrean heaven, and if these nebulæ be not this shining region seen through an opening a chasm of the sphere (probably crystalline) of the *primum mobile*. Huyghens held a similar opinion. But comets have long broken in pieces the solid spheres to which the ancients attributed such an important part in the mechanism of the universe. Further evidence, however, as to the *characteristic* light of some true nebulæ is to be found in the words of Herschel the younger.

"In all the (resolvable) nebulæ the observer remarks (whatever may be the magnifying power) shootings forth as from stars, or at least he believes that he feels as if he would perceive them if his vision became more distinct. The nebula of Orion produces an entirely different sensation, giving rise to no idea of stars."

Again, the light of the *great* milky spots is generally very feeble, and uniform ; here and there only, we remark some spaces a little more brilliant than the rest.

On what can this augmentation of intensity depend? Does it depend on a greater *concentration*, or a greater *depth* in the nebulous matter? The choice between these two explanations is not a matter of indifference.

The places where a comparatively bright light is observed in these great nebulosities, are commonly *of small extent*. If, then we wish to ascribe the phenomenon

to the greater depth of the nebulous matter, it is necessary to suppose that a kind to column of the same matter corresponds to each of the points in question; a rectilinear column, very condensed, and *directed exactly towards the earth.* This specialty of direction may seem possible in such or such particular point. It could not be the same either for the whole of the circumscribed radiating places resented by the whole firmament, nor even for two, three, or four of these places which are remarked in a single nebula. It must, therefore, be admitted, that it is the produce of a condensation, an increase of density in certain points of the nebulous spaces, the vast extent of which we have already computed.

Is this condensation the effect of an attractive force, analogous to that which predominates over and regulates all the motions of our solar system? Such is the magnificent problem which we must now endeavour to solve.

In after times, it will be sufficient to throw a double glance, one on the nebulæ of the period, and another on the drawings, so admirable for their delicacy and fidelity, which astronomers of the present day have given of them, to enable the question to be decided, whether time sensibly alters the dimensions and forms of these mysterious groups; but antiquity having left no term of comparison in this respect, we are reduced to the necessity of encountering the problem by indirect means.

However, I have every reason to hope that the solution of it will not appear much the less evident.

The phenomena, which the existence of diverse centres of attraction, spread over the whole extent of a single and vast nebula, ought to produce, would develope themselves in this order:—

Here and there, the disappearance of the phosphorescent light; the commencement of breaks in the continuity, or *rents* in the primitive luminous curtain, the necessary result of the motion of the matter towards the attractive centres;

The increase of the rents, that is to say, the transformation of a single nebula into many distinct nebulæ, but little distant from each other, and sometimes connected by very delicate fillets of nebulosity;

The *rounding* of the exterior contour of the separate nebulæ; an augmentation more or less rapid of their intensity from the circumference to the centre;

The formation at this centre of a nucleus, very apparent either by its dimensions or its splendour;

The passage of each nucleus to a stellar state, with the continuance of a slight surrounding nebulosity;

Finally, the precipitation of this last mentioned nebulosity, and, as the definite result, as many STARS as there were distinct centres of attraction in the original nebulosity.

And in what length of time can a single and same nebulosity undergo all this series of transformations? Of this we are absolutely ignorant. In some instances, perhaps millions of years would be necessary; in other instances, with other conditions of extent, density, physical constitution, and phosphorescent matter, much shorter periods would be sufficient, as the sudden appearance of the new star of 1572 seems to indicate.

The unequal rapidity of the transformation leads to one important consequence.

In departing from this basis, it is evident that the nebulæ, if they were all of the same age, must, *taken altogether*, present the various forms which I have enumerated. To one region, ages would scarcely bring a visible accumulation of phosphorescent matter round some centres of attraction; towards another region, owing to a more precipitate movement of concentration, we should already find groups of nebulæ with a nucleus; nebulous stars would at last present themselves here and there, as the last step leading to stars properly so called.

All these states of the nebulous matter indicated by theory, observation had discovered beforehand. The argument is as satisfactory as could be desired; only, instead of following the transformations in a single nebula, step by step, their development and progress have been determined by observations made on them collectively. Is it not thus that the naturalist acts, when he is compelled to describe, for all ages, the habit, size, form, and external appearances of the trees composing the forests he is rapidly crossing? The modifications which a very young tree shall undergo, he perceives distinctly and unequivocally with a glance of the eye at an object of the same kind which has already arrived at the most complete degree of growth and development.

The idea we have been developing is as old as the memory of Tycho Brahe. He regarded the new star of 1572, as the result of the recent

agglomeration of a portion of the diffused matter, disseminated throughout all the universe, which he called celestial matter. He even saw an *obscure space* as large as the half of the moon's disc, in the very place where the star appeared. He had no remembrance of having observed it before.

Kepler composed the new stars of 1604 of the agglomerated matter of ether.

The opponents of the great ideas I have referred to, seem to have entered upon a more serious field of objections, when, founding their opinion on the excessive rarity of the diffused matter, they *assure* us that the whole of this matter observed in all the regions of space, would not compose a star comparable to our sun in size and density. A calculation of Herschel's has reduced the difficulty to its true value.

Let us take a cubical agglomeration of nebulous matter, the side of which, seen from the earth, subtends only an angle of ten minutes. Let us suppose that this agglomeration is situated in the region of stars of the eighth or ninth magnitude. The calculation will shew, that its volume will rise to more than two trillions of times that of the sun. This result may be put in this other form : the diffused matter contained in the cube of 10' the side, after having been condensed more than two trillions of times, would still occupy as large a volume as our sun. Now, have these objectors reflected on the condensation expressed by the prodigious number of two trillions ? The objections against the actual production of stars, founded on the rarity of the diffused matter, may therefore be set entirely aside.

Comparative intensities of the total light of a Nebula, and the condensed light of a Star.—After having examined the questions of volume and density, it ought to be asked if the feeble scattered light of a nebula would be sufficient to produce, by means of concentration, the lively, penetrating, scintillating light of a star ?

Herschel, I believe, never studied the problem in this light. But, if I am not mistaken, it may be illustrated in a few words.

Nothing being first established in principle, I hasten to remark, that the condensation of the diffused matter *does not increase the luminous properties* of each of the molecules. But I set entirely aside this possibility of increase of splendour, and reduce the question to very simple terms ; are the feeble lights spread over all the points of such or such a diffused nebula, equal *in the sum*, to the light of such or such a star ?

There are no practicable experimental means of conveniently uniting in a single point, the light emanating from the whole superficial extent of a nebula. The inverse operation is, on the contrary, easy. If we gradually withdraw the glass of a telescope from the place which it occupies when the vision is distinct, we see the image of each star successively *enlarge* and lose its intensity. In displaying one of these images in this manner, till we make it fill nearly the whole field of vision, we make it at last not more brilliant than the milky nebula. This once obtained, calculations into which various elements enter, as well as various corrections of which I cannot give a complete enumeration without exceeding the limits imposed on me, lead to the results sought for : I may say to the numerical approximations which exist between the intensities of the total lights dispersed over a great extent of milky nebula, and the concentrated light of stars. The result of these experiments and calculations strengthens the ideas of Tycho, Kepler, and Herschel, on the transformation of nebulæ into stars.

By comparing the observations of 1780 and 1783, with those of 1811, Herschel found that the nebulæ of Orion had greatly changed in form and extent. This, according to the expression of Fontenelle, was to *have caught nature in the fact.* Having made his observations with the same power, he was able to say. "I have *proved* these changes."

Planetary Nebulæ. ***Is it true that, in order to explain the uniform luminosity of their discs, it is indispensably necessary to suppose that the diffused matter is opaque after it reaches a certain degree of concentration?***—Herschel applied the above name to nebulæ which resemble the planets of our system in form. They are circular or slightly elliptical ; some have their contours distinctly defined ; others appear surrounded by a slight nebulosity ; their light is equally bright over the whole extent of the disc. Among the planetary nebulæ discovered by Herschel, I find some of ten, fifteen, thirty and even sixty seconds in diameter.

Herschel regarded the physical constitution of planetary nebulæ as very problematical. His fertile imagination could furnish him with nothing very plausible or satisfactory on this subject. These bodies could not be likened to the globular nebulæ composed of stars, without explaining why their light did not present any increase of intensity towards the centre. To transform the planetary nebulæ into stars, properly so called, was to disregard all analogy; it was to create stars with actual diameters thirteen thousand times greater than the diameter of the sun (diameters of 4600 millions of leagues), and to ascribe to stars a kind of dull light which no star has hitherto exhibited.

After much hesitation, Herchel decided on considering the planetary nebulæ as agglomerations, *already very much condensed*, of the diffused matter. This assimilation, it cannot be disguised, demands a hypothesis which appears not very natural. In order to explain why the lustre of nebulous planetary discs is not much stronger in the centre than towards the edges, it is necessary to admit that the light does not come from the whole depth of the nebula (otherwise its intensity would increase with the number of material and radiating particles contained in the direction of each visual ray); it is necessary to reduce the radiation to the state of being purely superficial; we must grant, in other words, that when it attains a certain density, the diffused milky matter, as one would call it, *ceases to be diaphanous.*

I do not know, but it seems to me, that all these suppositions may be avoided by admitting that these planetary nebulæ are *nebulous stars*, so remote from the earth that the central *star* no longer predominates by its spendour over the diffused luminosity with which it is surrounded. It would be superfluous to repeat here what I have already said in another part of this essay.

I add a single word on the danger that would arise from drawing too absolute consequences from the evolutions of the diffused matter, and the various forms it may assume when agglomerating. Has it not been alleged but lately, that, in the nebula of Orion, the milky substance is not in immediate contact with the stars of the celebrated trapezium so well known to all astronomers? Has it not been said that these stars are, as it were, isolated in the midst of the nebulosity, and that a dark space surrounds them? Astronomers, I admit, have not yet *demonstrated* that we ought to see, in the phenomenon of which I have spoken, any thing else than a simple effect of contrast; nothing proves that it is any thing else than a very feeble light becoming effaced by the contact of a more brilliant one. To remove all doubts, it is necessary to throw, by means of the reflection of a flat diaphanous mirror with parallel faces, placed before the object-glass or the aperture of a telescope, the image of some star on the image of the nebula, and observe if the image of the star thus reflected shall seem likewise surrounded with a dark space. In the mean time, every thing authorizes us to suppose that the milky molecules are subjected, in the vast regions of space, to forces of which we have no idea. The observers who have followed the prodigious, and often almost instantaneous, changes of Halley's comet in its last appearance, will not gainsay me; the reserve I recommend will appear to them, I hope, quite natural.

Diffused cosmic matter, not luminous of itself, and imperfectly diaphanous.—Herschel thinks that he has determined, by the observations I am about to mention, that besides the diffused matter, luminous of itself of which we have spoken so much, there exists in space another equally diffused, but not radiating, and imperfectly diaphanous.

In March 1774, this celebrated astronomer perceived on the north of the great and beautiful nebula of Orion, on both sides of the celebrated nebulous star signalized by Mairan, two other smaller stars surrounded in the same manner with circular nebulosities. "In the month of December 1810, the nebulosities of these two small stars were dissipated. On the 19th January 1811, no trace of them was to be seen, even with a telescope of 39 feet. With regard to the nebulosity of the principal star, it had undergone no change save becoming very much weaker.

Herschel believed that the three nebulosities in question were not real. When a star is seen through a mist, it appears to be in the centre of a luminous glory. This glory is composed of a portion of the mist illuminated by the star. An analogous cause produced, according to this illustrious astronomer, the nebulosities observed in 1774 around the three stars mentioned; only, the ordinary mist was replaced by a cosmic matter, nearer to us than the three stars situated, however, in the high regions of the firmament, and in immediate connection with the great nebula of Orion. The matter did not shine with its own light, since, at a certain distance from the three stars, no trace of it was seen. It reflected strongly

towards our eye the starry rays which traversed it, under incidence very little removed from the perpendicular; it wanted that extreme diaphaneity which our fancy takes pleasure in conferring on gaseous matters situated in the celestial spaces; finally, it was by obeying a clustering power, which all the nebulous matter of Huygens is subject to, that it ceased in 1810 to interpose itself exactly between the two small stars and us, and thus it happened that the phenomenon so visible in 1774 no longer existed 36 years after*.

Such is Herschel's theory, if I understand it aright. I shall not here consider whether it might not have been more simple to assimilate the circular nebulosities of the three stars of Orion to the luminous atmospheres of ordinary nebulous stars, than to attribute the weakened light of the largest, and the disappearance of the two others, to a motion of the atmospheres towards the centre of each star."

The Milky Way is the name applied to that luminous whitish zone, which goes round the whole firmament, nearly tracing one of its great circles, not, however, without undergoing a sharp bifurcation, from which results a secondary bow, which after continuing separated from the principal arc, for the extent of about 120 degrees, again becomes confounded with it.

Of the ancients, Democritus and Manilius thought, that the lively lustre of the milky way arose from the stars in it being too close upon each other for us to see them, considering their prodigious distance, one by one; from the images of so many stars greatly condensed being confounded with each other. This explanation Galileo revived, and by precise observations, made for the first time with telescopes, he brought it out to a certain point from the domain of mere conjecture.

But the *form* of the phenomenon, its continuity, and the almost perfect coincidence of its principal branch, with one of the great circles of the sphere, astonishing as they are, can hardly be the effect of chance. It was in the form and position of the milky way, considered as an agglomeration of stars, that Herschel thought he had discovered the secret of the construction of the universe.

Three thinkers, if not observers, had preceded him,—Wright, Kant and Lambert. Wright rejected all idea of a fortuitous disposition of stars: on the contrary, he admitted "a systematic disposition of the stars around a ground plane." Kant completes Wright's idea. He observes that the plane on both sides of which the stars are grouped must necessarily pass by the earth.

"In admitting," he adds, "that the stars are nearer the plane in question than the other regions of space, our eye, in plunging into the starry plain, would believe that it perceives on the contour of the apparent vault of the firmament, the *whole* of the stars near the plane; they will there form a zone which will be distinguished from the rest of the heavens by a greater luminous intensity. This zone of light will extend itself in a great circle, since the eye of the observer is supposed to be in the plane itself of the stratum of stars. The stars, finally, being very small and very numerous, will not be distinguishable one from another; they will produce a confused light, of a uniform whitish colour; in other words, a milky way.

Kant was well aware that, in his hypothesis, the appearances of the starry heavens ought, to a certain point, to present something gradual. Thus he adds: "The regions not comprised in the whitish track of the Milky Way, are the richer in stars the nearer they approach the centre of that track; the greater

* The authenticated disappearance of a starry nebulosity would be a very extraordinary phenomenon and very fruitful in results. I have, therefore, thought it requisite to inquire whether the annals of science offer any fact analogous to the two cited by Herschel. My search has not been, in my opinion, unfruitful. Lacaille, during his residence at the Cape, saw in the constellation Argo (310 Bode) five small stars in the centre of a nebulosity of which Mr. Dunlop, with much better instruments could perceive no traces in 1825.

part of the 2,000 stars discernible in the firmament by the naked eye, is included in a zone not very broad, of which the Milky Way occupies the centre."

Kant condensed his ideas in the fewest words possible, when he called the Milky Way "*the world of worlds.*"

We likewise find an explanation of the Milky Way, in the *Cosmological Letters* published at Leipsic in 1761. From the contemplation of the heavens, Lambert came to the following conclusions;—The system of the stars is not spherical: the stars, on the contrary, are arranged nearly in a uniform manner between two planes, extending in every direction, and comparatively near each other; our sun occupies a region but little remote from the immense stratum of stars.

The minute analysis of Herschel succeeded the imperfect conjectures of his predecessors. He began, to use his own picturesque expression, to *gauge* the heavens.

In order to determine the comparative mean richness in stars of any two regions of the firmament, the observer made use of a telescope whose field embraced a circle of fifteen minutes diameter. Towards the middle of the first of these regions, he counted successively the number of stars included in ten fields contiguous, or at least, very near each other. He added these numbers, and divided the sum by 10. The quotient was the mean richness of the region explored. The same operation, the same numerical calculation, gave him an analogous result for the second region. When this last result was double, triple, —decuple the first, he legitimately deduced the consequence from it, that in an equal extent, one of these regions contained twice, three times, or ten times more stars than the other; that it presented a condensation, a degree of richness, double, triple, decuple.

The gauging tables, or soundings of the firmament, which form part of a memoir printed in 1785, in the 75th vol. of the Phil. Trans., present regions where the mean number of stars embraced in the field of Herschel's telescope was only 5, 4, 3, 2, and 1. We even find some, among which at least *four* successive fields were required to meet with *three* stars. Elsewhere, on the contrary, these fields, although so restricted,—these circular areas of 15' diameter,—contained 300, 400, 500, and even 588 stars! When the telescope was directed towards the most thickly *peopled* regions, the eye, applied to the glass, saw, in the short interval of a quarter of an hour, 116,000 stars! These numerical results are truly *prodigious.* The word prodigious, in relation to the number 116,000, will seem no exaggeration to any one who knows that the stars visible to the naked eye throughout the whole nights of the year, do not exceed about 5000, and that the ancients were acquainted with only 1022. The word will appear equally natural if we apply it to the 400, 500, and 600 stars seen simultaneously in the telescope, provided it be kept in mind, that, with a diameter of 15', the field of the instrument embraced only a fourth part of the apparent surface of the sun.

The general aspect of the Milky Way, its form, and starry composition, deduced from telescopic observations, are explained very simply, by supposing with Herschel, that millions of stars, nearly at equal distances from each other, form a layer or stratum, comprised between two even surfaces, parallel to and near each other, but prolonged to immense distances; that the stratum is thus very thin, compared with the immense distances to which the two even surfaces which contain it extend in every direction; that our sun,—that the star around which the earth revolves, and from which it does not far recede,—is one of the stars composing this stratum; that we occupy very nearly the centre of it, both relatively to its thickness and to all its other dimensions. These suppositions once admitted, it will be easily understood, that a visual ray, turned in the direction of the immense dimensions of the stratum, will there encounter everywhere a multitude of stars, or, at least, that it will pass so near them that they will seem to touch each other; that, in the direction of its thickness, on the contrary, the number of visible stars will be comparatively smaller, and precisely in the relation of half the thickness to the other dimensions of the stratum; that, in the passage of the visual lines coincident with the extended dimensions, to the transverse directions, there will be, in this respect, a sudden change; that the greatest dimensions of the stratum will thus be found indicated, or, as it were, delineated on the firmament by an apparent condensation of stars, by a maximum of manifest light, and a milky aspect; finally, that the maximum of light will *appear* to be a great circle of the celestial sphere, since the earth may be considered as the centre of this sphere,—since the stratum is one of its diametral

plane,—and that every diametral plane of a sphere, every plane passing by its centre, necessarily divides it into two equal parts, or, what is the same thing, cuts it according to one of its great circles. The secondary arc, detached from the principal arc of the Milky Way, towards Cepheus and Cassiopea, and rejoining it between Scorpio and Sagittarius, discloses the existence of a stratum of stars forming a small angle with the principal stratum, and again meeting it near the region which the earth occupies, and not extending beyond.

In short, if we see a much greater number of stars in certain directions than in others; if the regions with thickly placed stars form one of the great circles of the sphere; if the principle arc is double for an extent of 120°,—it is because we are plunged in a group of excessive extent and comparatively very thin; because we occupy very nearly the centre of it; and because a second group of the same form meets the first towards the region where our sun, and consequently the earth, are situated.

If we suppose that the stars of the Milky Way, *taking them altogether*, are uniformly distributed throughout all the regions of this nebula; if we admit, moreover, that the observer gauges this curious portion of the heavens with an instrument, whose power permits him to reach, in every direction, the last limits of the *starry stratum*, the number of stars contained in the visual field of the telescope will be, in each observation, so intimately connected with the length of the line comprised between the eye of the astronomer and the terminal limit of the stratum, that one of these quantities may always be deduced, by calculation, from the other. Herschel having gauged our nebula, and having estimated, as I have mentioned above, its riches in stars in all directions, was therefore in a condition to deduce therefrom the corresponding linear dimensions. The table included in his memoir of 1785, gives the distance from the earth *to the limits of the Milky Way*, that from the earth to Sirius being regarded as unity.

When the field of the telescope includes	*one* star, the distance in question is	58
	10 stars	127
	20	160
	50	218
	100	275
	200	347
	300	397
	400	437
	500	471
	600	500

Without, therefore, going beyond the limits of direct observations, the nebula is thus found to be *a hundred times* more extensive in one direction than in another. The numbers which I have given are those which the scrupulous observer has himself made use of to give a section, and even a figure, under three dimensions, of the vast nebula, in which our Sun figures as an insignificant star, and the Earth as an imperceptible grain of dust.

Will the Milky Way endure for ever in the from in which we now see it? Does it not begin to shew symptoms of dislocation and dissolution?—Herschel has clearly established, by thousands upon thousands of observations, that the whiteness of the Milky Way proceeds, *in the greater part*, from agglomerations of stars, too small and too feeble to be distinguished separately. The diffused matter, mingled in certain proportions with the stars, here plays a part as in many resolvable nebulœ; but it is evidently a *secondary* part.

Almost in every instance in which stars placed near each other are presented to our view without the apparent limits of the Milky Way, we have perceived that they tend to group themselves around many centres; that they seem to obey, like the various bodies of our solar system, an attractive force; that this force, in fine, has already produced, in certain rounded groups, very considerable effects and concentrations. Why should the stars of this great nebula, of which we form a part, escape this kind of action more than the others? If formerly they were uniformly distributed, this state must cease, and approach its termination, more and more every day. Facts confirm the results of reasoning. The stars, far from appearing uniformly distributed over the whole extent of the Milky Way, have presented to Herschel, armed with his telescopes, 157 distinct and circumscribed groups, which have taken their place in the catalogue of nebulæ, without reckoning eighteen analogous groups situated on the edge of this same zone.

Any one who examines with his eye, during a dark and very clear night, the

portion of the Milky Way comprised between Sagittarius and Perseus, may remark in it eighteen regions perfectly characterized by the particular brilliancy of their light.—I shall here mention a few of these :—

There exists—*a very brilliant spot under the arrow of Sagittarius.*—There is—*a very brilliant one in the shield of Sobieski.*—We perceive—*a brilliant one* to the north and a little to the west of the *three stars of Aquila.*—We notice——*one* long and feeble which follows *the shoulder of Ophiuchus.*—We remark—*three* brilliant ones near the stars α, β, and γ of *Cygnus,*—We distinguish *three* towards and within *Cassiopea.*—There is—a very brilliant *one* in the hilt of Perseus' Sword.

(Between κ and γ of Cassiopea, there exists a very obscure place.)

No portion of the Milky Way resolvable by the telescope, has exhibited to Herschel more manifest indications, and on a larger scale, of the clustering power of stars, than the space which separates β and γ of *Cygnus.* By gauging this space, according to the method already described, for a breadth of about 5 degrees, Herschel found that 331 thousand of stars might be counted in it. This immense group already presents a kind of division ; 165 thousand stars appear to proceed to one side, and 165 thousand to the other.

Everything, therefore, justifies the opinion of this illustrious astronomer. In the series of ages, the clustering power will inevitably bring on the fracture, rupture, and dislocation of the Milky Way.

We quote a portion of an interesting article (extracted from *Poggendroff's Annalen,* 1842, *No.* 3) on Platina and Diamonds in Borneo.

The occurrence of platina in the East India Archipelago is but little known, and it is probably quite new to many that this metal is actnally obtained there in large quantity*. Upon this subject we have acquired accurate information from the late Dr. Ludwig Horner. * * * At the south-eastern extremity of Borneo, named Tanah Laut (Seeland), there ends a mountain-chain which accompanies the course of the great river of Banjermassing, and which has been traced to the north of the Equator. The most southern portion of the mountain range is termed the Ratoos Mountains, whose highest summit rises 2168 Parisian feet above the sea, and these are chiefly composed of serpentine, diorite, and gabbro. The valleys and the base of these mountains are covered by a thick deposit of red clay, in which there is an imperfectly defined bed of white quartz pebbles. In the valleys the red clay is from 10 to 20 feet deep, and the bed of quartz pebbles is from 1 to 4 feet thick. It is this deposit which contains the gold in extremely small plates, associated with large quantity of grains of magnetic iron-ore, and every where with small grains of platina, as well as of iridium and osmium, but not of palladium. The strata repose directly on serpentine, and are evidently derived from it ; the red clay having had its origin from the rock itself, and the quartz from the quartz veins which traverse the serpentine in great numbers. This is in the district of *Poelo* (Pulo) *Arij,* where 150 Chinese wash out yearly 750 taël of gold†, whose value amounts to 45,000 Dutch florins.

The diamond mines lie more to the north, but likewise on the west side of the Ratoos Mountains ; there, likewise, a red bed of clay stretches over the surface, 6 to 7 fathoms deep, and there is also a bed, one fathom deep, composed of quartz pebbles, and fragments of syente and diorite ; more rarely a marl occurs, containing recent shells (*Ostræa cardium*). In this deposit the diamonds are distributed, sometimes accompanied by magnetic iron sand, by plates of gold and platina, and by small pieces of native iron. The surest sign of the presence of diamonds is the occurrence of small pieces of black quartz, with disseminated iron-pyrites and platina, which are termed *Batoe* (Batu) *Timahan,* or *Batoe Parak Jatam.*

A considerable quantity of gold and platina is obtained along with the diamonds. In the districts of Goenong (Gunong) Lawak, Tapang, and Oedjong Moerung (Udjong Murong) alone, 4000 workmen are employed in the process of washing.

The author adds that though the occurrence of Platina was made known by Mr. Hartmann in 1831, no advantage has since been taken of it. He enumerates the various sources of its produce, shewing the extent of its loss, and concludes by saying:—

We are probably under the mark, when we estimate the annual quantity of platina lost in Borneo at 5000 taël, or 10,000 ounces, that is, 625 pounds.

* The only other part of Southern Asia where this metal has been met with is Ava.

† A taël is 2 ounces.

HYDROMETICAL OBSERVATIONS: BY DAVID STEVENSON, ESQ., CIVIL ENGINEER*.

Velocities of Currents.—For the purpose of ascertaining the surface velocities of currents, various methods may be employed.

The most common, but by no means the most satisfactory, mode of proceeding, is to throw into the water a float composed of some small body (whose specific gravity is merely great enough to sink it to a level with the surface), at a point about 30 to 40 feet above the line of section, so as to insure its acquiring the full velocity of the current before it reaches the cord. An observer, stationed at the cord, notes exactly the moment at which the float passes, and follows it down the stream till he reaches the line of two poles, which have been fixed in reference to the observations, when he again notes the exact moment of its transit at the lower station. The elapsed time between the two transits is then noted in the book, along with the distance between the two places of observation, which, owing to the irregularity of most rivers, with regard to width, depth, and velocity, can seldom be got to exceed 100 feet. This operation has, of course, to be repeated for every compartment of the cross section.

Certain disadvantages attend this method, which render is not generally applicable. For example, it is only adapted to rivers of limited breadth, owing to the impossibility of an observer being able to discover with sufficient accuracy when the float passes the station lines, if it be viewed from a distance, as from the bank of a broad river. There are, however, greater objections than this, which, when pointed out, will be sufficiently obvious to every one. In any part of the river passed over by the floats, the slightest irregularity of the bottom produces a disturbance in the motion of the stream, and alters the velocity of the current, so that the result indicated by the elapsed time is more or less vitiated, and the mean velocity deduced from such data, is not, in almost any case, that which exists at the line of cross section. It is also impossible, by this method, to obtain a sufficient number of distinct and independent observations, applicable to each division of the stream, as the eddies and irregularities of the currents which exist in all rivers, generally cause the lines passed over by the floats to cross and interfere with each other in such a manner as to destroy all connection between any given series of observations, and the several compartments of the river, whose mean velocity they were intended to ascertain.

The superiority of the method which I am about to describe, consists in ascertaining the velocity of each portion of the stream, in the exact line in which the cross sectional area is taken. The instrument employed for this purpose is a modification of the tachometer of Woltmann, which is in general use in France and Germany, both as an anemometer and a hydrometer, being made of the degree of delicacy suited to the purpose to which it is to be applied. In this instrument the velocity is measured by the current impinging on a vane and causing it to revolve, the number of revolutions made by the vane being registered on an index, which is acted on by a set of toothed wheels.

The construction of this beautiful instrument, and the manner in which it acts, will be best described by a reference to [Plate 5 fig. 1] which is taken from a tachometer or stream guage made by Mr. Robinson, optician, London, and is drawn to a scale of one-third of the full size. In this view, *f f* represents what may be termed the driving vane, which is acted on by the stream, and of which *g* is a plan. The plane of this vane is twisted as represented by the dark shading in the cut, so as to present, not a knife-edge, but an oblique face to the action

* The interesting observations and experiments in this article are taken from a valuable work just published, and which we recommend to the particular attention of engineers, viz.—"A Treatise on the application of Marine Surveying and Hydrometry to the practice of Civil Engineering, by D. Stevenson, Civil Engineer, and author of a Sketch of Civil Engineering in America, &c. 1 vol. royal octavo, with numerous plates and plans, &c. Adam and Charles Black, Edinburgh; Longman & Co., and L. Weale, London. 1842."

of the current, which, by impinging on it, causes it to revolve exactly in the same way that the wind propels the sails of a windmill. On the spindle or shaft of this vane, or endless screw is fixed at *e*, which works in the teeth of the first registering wheel, and causes it to revolve, when the vane is in motion and the screw in gear. Letters *a* and *b* represent a bar of brass, to which the pivots on which the registering wheels revolve, are attached. This bar is moveable on a joint at *b*; and at the point *a*, a cord *a c* is fixed, by pulling which the bar and wheels can be raised, and on releasing it they are again depressed by a spring at *d*. When the bar is raised, the teeth of the wheel are taken out of gear with the endless screw, and the vane is then left at liberty to revolve, the number of its revolutions being unregistered; but when the cord is released, the spring forces down the wheels, and immediately puts the registering train into gear, in which state it is represented in the cut. Letter *h* is a stationary vane (which is shewn broken off, but measures about 9 inches in length) for keeping the plane in which the driving vane revolves at right angles to the direction of the current, and *k* is the end of a wooden rod to which the tachometer is attached when used. The different parts of the instrument itself are made of brass.

The moveable bar for the registering wheels and the application of the cord and spring which have been described, afford the means of observing with great accuracy in the following manner. The instrument having been adjusted by setting the registering wheels at zero, or noting in the field book the figure at which they stand, the cord is pulled tight so as to raise them out of gear, and the instrument is then immersed in the water. The vane immediately begins to revolve from the action of the current, and is permitted to move freely round until it has attained the full velocity due to the stream. When this is supposed to be the case, a signal is given by the person who observes the time, and the registering wheels are at that moment thrown into gear by letting the cord slip. At the end of a minute another signal is given, when the cord is again drawn and the wheels taken out of gear, and on raising the instrument from the water, the number of revolutions in the elapsed time is read off. This operation being completed in the centre of each division of the cord, the number of revolutions due to the velocity at each part of the very line where the cross section is taken, is at once obtained.

Before using the tachometer, it is obvious that the value of a revolution of the vane must be ascertained; and although this is done by the manufacturers, it is proper that the scale of each instrument should be determined by the person who uses it, and that it be tested if the instrument has been out of use for some time, before being again employed in making observations. A scale sufficiently accurate for most hydrometrical purposes (though not for the instrument when used as an anemometer) may be obtained by applying it to some regular channel, such as a mill-lead formed of masonry, timber, or iron, where the velocity is nearly the same thoughout, and noting the number of revolutions performed during the passage of a float over a number of feet, measured on the bank. In this way it was found, by the mean of 62 observations, that each revolution of the vane in the instrument of which a drawing has been given, indicated the passage of the water over 46 inches. The number of revolutions at the several parts of the stream was ascertained to be the same in equal times, at both the commencement and the end of the experiments. This number, therefore, becomes in the instrument alluded to a constant multiplier of the number of revolutions indicated by the vane; and hence, the number of feet passed over by the water in the given interval of time is ascertained.

The direction of the under current, which it is sometimes interesting to know, cannot, however, be obtained by means of the tachometer, and I shall describe a plan for obtaining an approximation to both the velocity and direction of under currents, which is of easy application, and may be useful to those employed in engineering investigations. The plan to which I allude was devised and used at the Cromarty Frith in 1837, by Mr. Alan Stevenson, who discovered, by means of the instrument he employed, the interesting fact, that, at the depth of 50 feet, the velocity of the current, at both flood and ebb, is in certain places of the Frith nearly double that at the surface. This instrument, which of course merely gave an approximate result, consisted (as shewn in Fig 2 Plate 5 at letter *a*) of a flat plate of sheet iron, measuring 12 by 18 inches, having a vane made of the same material,

and measuring 4 feet in length, fixed at right angles to the centre of it. The lower edges of the plate and vane were loaded with bars of iron, for the purpose of causing the instrument to sink to the requisite depth; and it was so slung as to preserve the surface of the plate in a vertical plane. The apparatus was secured by a cord of sufficient length to sink it to the required depth, and the whole was attached to a tin buoy, letter *b*, which floated on the surface, its form being such as to produce little resistance to its passage through the water. The buoy served not only to preserve the vane plate at the same depth, but also indicated its progress through the water in a very satisfactory and often interesting manner.

The plate, sunk at the depth of 50 feet, when acted upon by the force of strong under current, was hurried along, carrying the buoy, which floated on the surface, along with it, a circumstance which was ascertained by the buoy passing the floats thrown out on the water as gauges, of the velocity and direction of the upper current, one of which is shewn at *c*. The only precaution to be observed in making such observations, is to exclude that part of the commencement of the buoy's course, which is more rapid than it ought to be, owing to the effort made by it to overtake the plate, which, being sunk first, has been influenced by the velocity of the current before the buoy has been launched. It is evident that, by means of this simple apparatus, we can approximate to the direction as well as to the velocity of under currents; but it must be kept in view that, in either case, there are several deranging influences in operations, which tend to render the result obtained merely rude approximations to the truth.

The direction of surface currents may be easily observed by means of a string of cork floats. Any change in the direction of the line traced by the floats is noted by observations made with the surveying compass or the sextant, by an observer stationed in a boat, which is rowed alongside of the line marked out.

The last hydrometrical topic which shall engage our attention, is the method of obtaining specimens of water at different depths, with a view to ascertain its qualities in regard to the proportion of sea salt which it contains, or the quantity of sand or mud held in mechanical suspension.

The first observations made on this subject, so far as I am aware, were those instituted by my father on the River Dee in Aberdeenshire, in the summer of the year 1812, when engaged in surveying that river in reference to a salmon fishing case*. "He observed in the course of his survey that the current of the river continued to flow towards the sea with as much apparent velocity during flood as during ebb tide, while the surface of the river rose and fell in a regular manner with the waters of the ocean. He was led from these observations to enquire more particularly into this phenomenon, and he accordingly had an apparatus prepared, under his directions, at Aberdeen, which, in the most satisfactory manner, shewed the existence of two distinct layers or strata of water; the lower stratum consisting of salt or sea water, and the upper one of the fresh water of the river, which, from its specific gravity being less, floated on the top during the whole of flood as well as ebb tide. The apparatus consisted of a bottle or glass or jar, the mouth of which measured about 2½ inches in diameter, and was carefully stopped with a wooden plug, and luted with wax; a hole, about half an inch in diameter, was then bored in the plug, and to this an iron peg was fitted. To prevent accident in the event of the jar touching the bottom, it was coated with flannel. The jar so prepared was fixed to a spar of timber about 20 feet in length, which was graduated to feet and inches, for the conveniency of readily ascertaining the depths to which the instrument was plunged, and from which the water was brought up. A small cord was attached to the iron pin for the purpose of drawing it at pleasure for the admission of the water. When an experiment was made, the bottle was plunged into the water: by drawing the cord at any depth within the range of the rod to which it was attached the iron peg was lifted or drawn, and the bottle was by this means filled with water, of the quality at the depth to which it was plunged. The peg was again dropped into its place, and the apparatus raised to the surface, containing a specimen of water. In this manner, the reporter ascertained that

* Report to the Earl of Aberdeen and the other proprietors of the "Raik" and "Stell" fishings of the river Dee, at Aberdeen, by Robert Stevenson, Civil Engineer. Edinburgh, Feb. 1813.

the salt or tidal water of the ocean flowed up the channel of the River Dee, and also up Footdee and Torryburn, in a distinct stratum next the bottom and under the fresh water of the river, which, owing to the specific gravity being less, floated upon it, continuing perfectly fresh and flowing in its usual course towards the sea, the only change discoverable being in its level, which was raised by the salt water forcing its way under it. The tidal water so forced up continued salt, and when the specific gravities of specimens from the bottom, obtained in the manner described, were tried, and compared with those taken at the surface, by means of the common hydrometer of the brewer (the only instrument to which the reporter had access at the time), the lower stratum when compared with that at the surface was always found to possess the greater degree of specific gravity due to salt over fresh water."

The appearance of the fresh water floating on the surface of the sea, is no doubt familiar to most persons. It occurs at the mouths of many of our rivers, and is most apparent when they are in flood, from the brown tinge given to the water, which is easily discoverable for many miles at sea. The great American rivers furnish many remarkable instances, particularly La Plata and the Amazons. On this subject, the following passage from the work* of Father Manuel Rodriguez, a Spanish Jesuit, is interesting, and its correctness, as regards the extent to which the influence of the river is felt, has since been corroborated by the investigations of Colonel Sabine.† "This river," says Rodriguez, in speaking of the Amazons, "is like a tree; its roots enter as far into the sea as into the land, so that it communicates to it a flavour; so that at 80 leagues within the sea, its waters are seen and taste sweet, and in a semicircle of 100 leagues in circumference, they form a gulph not in the least brackish, so that the sailors call it the fresh sea."

The instruments now used for obtaining water from different depths, are more perfect in their construction than that already alluded to as having been used at the Dee, which, as has been seen, was made for a temporary purpose. Instruments of various constructions have of late been tried for experimenting on this subject; and, as I am not aware that any work on marine surveying, or on surveying instruments, contains a description of such an apparatus (to which I have applied the name of the *hydrophore**,) the following account of two modifications of it, both of which I have been in the habit of using, may perhaps be instructive.

Fig. 3. represents a hydrophore used for procuring specimens of water from moderate depths, drawn on a scale of one-tenth of the full size. It consists of a tight tin cylinder, letter *a*, having a conical valve in its top *b*, which is represented in the diagram as being raised for the admission of water. The valve is fixed *dead*, or immovable, on a spindle working in guides, the one resting between two uprights or brass above the cylinder and the other in its interior, as shewn in faintly dotted lines. The valve-rod is by this means caused to move in a truly vertical line, and the valve attached to it consequently fits the hole in the top of the cylinder with greater accuracy than if its motion was undirected. A graduated pole *c*, which, in the diagram is shewn broken off, is attached to the instrument, its end being inserted in the small tin cylinder at the side of the large valve or water cylinder, and then fixed by the clamp screws shewn in the diagram; the bottom of the water cylinder may be loaded with lead to any extent required. The spindle carrying the valve has an eye in its upper extremity to which a cord is attached for the purpose of opening the valve when the water is to be admitted, and on releasing the cord, it again closes by its own weight. When the hydrophore is to be used, the cylinder is lowered to the required depth by the pole which is fixed to its side; or if the depth be greater than the range of the pole, it is loaded with weights, and let down by means of a rope so attached as to keep it in a vertical position. Care must be taken while lowering or raising it, that the small cord by which the valve is opened be allowed to hang perfectly free and slack. When the cylinder has been lowered as far as is required, the small cord is pulled, and the vessel is imme-

* El Maranam y Amazonas. Madrid, 1684, p. 18.

† An Account of Experiments to determine the figure of the Earth, as well as on various other subjects of philosophical inquiry, by Edward Sabine. London, 1825, p. 445.

* ὕδωρ and φορεω

diately filled with the water which is to be found at that depth. The cord being then thrown slack, the valve descends and closes the opening. The instrument is then slowly raised to the surface by means of the rod or rope, as the case may be, care being taken to preserve it in a vertical position. This apparatus is only applicable to limited depths, but will generally be found to answer all the purposes of the civil engineer.

The form of hydrophore, represented in figure 4, is used in deep water, to which the small one is inapplicable. It consists of an egg-shaped vessel, letter *a*, made of thick lead, to give the apparatus weight, having two valves *b* and *c*, one in the top and another in the bottom, both opening upwards; these valves (which are represented as open in the diagram) are, to ensure more perfect fitting, fixed on separate spindles, which work in guides, in the same manner as in the instrument shewn in the last figure. The valves, however, in that which I am now describing, are not opened by means of a cord, but by the impact of the projecting part *d*, of the lower spindle on the bottom, when the hydropore is sunk to that depth. By this means, the lower valve is forced upwards, and the upper spindle (the lower extremity of which is made nearly to touch the upper extremity of the lower one, when the valves are shut) is at the same instant forced up, carrying along with it the upper valve which allows the air to escape, and the water rushing in fills the vessel. On raising the instrument from the bottom, both valves again shut by their own weight and that of the mass of lead *d*, which forms part of the lower spindle. The mode of using this hydrophore is sufficiently obvious. This instrument weighs about half a hundred weight, and has been easily used in from 30 to 40 fathoms' water in making engineering surveys, and could, no doubt, be employed for much greater depths if necessary.

In all these experiment, the water being emptied into bottles, is corked up, and labelled with certain numbers, which should be entered in a book containing remarks as to the place of observation, time of tide, and such other particulars as, from the nature of the inquiry, seem to deserve notice; and the water thus preserved may be subjected to analysis, produced in evidence, or employed in any other way required by the circumstances of the case.

The marine productions of an estuary, such as the fish, shells, and plants which occur in it, occasionally affect questions regarding which an engineer may be consulted; but as it is not my present intention, as stated at the beginning of this chapter, to enter into the nature of the questions in which these investigations are required, or the manner in which they bear upon them, it is not considered necessary, in mentioning these productions, to do more than simply direct attention to the subject.—*Edin. New Philos. Journal.*

PURIFICATION OF GOLD.

The sum of Twenty Guineas was presented to Mr. Lewis Thompson, for the following Communication on his method of purifying Gold.

In the common mode of assaying gold, the alloy to be assayed is subjected to two operations, cupellation and parting, each of which requires great care and skill; so much so, indeed, that success seems rather to be the effect of a particular tact on the part of the assayer than the result of a well-defined chemical process. The plan which I now propose for assaying and purifying gold is no less simple in execution than certain in effect, and is founded upon a circumstance long known to chemists, viz.—that not only has gold no affinity for chlorine at a red heat, but that it actually parts with it at that temperature, although previously combined; that is to say, the chloride of gold is reduced to the metallic state by heat alone, it cannot therefore, possess any affinity for chlorine when red hot; this, however, is not the case with those metals with which gold is usually alloyed, it offers, therefore at once an easy and certain means of separation.

The application of these facts is all therefore to which I can lay claim, as the facts themselves have been known for many years, and the reason why they have not been so applied is, that hitherto chemists have not directed their attention to this art, but have left it entirely in the hands of the assayers, who are for the most part ignorant of chemistry.

The process here proposed has been abundantly tested by myself and others, and employed by those wholly unacquainted with chemistry, as well as by men of eminence in that science, with equal success. There is indeed but one source of failure, and this arises from the intense action of chlorine upon

the baser metals when melted, by which portions of the alloy are spirted up or projected from the cupel, as happens in the common mode of assaying silver when the heat is too great. This inconvenience is to be avoided in two ways. Firstly, by allowing the chlorine to be evolved slowly at the commencement of the operation, by which the intensity of the action at first is diminished, until the relative proportion of gold in the alloy is increased; or secondly, by passing the chlorine over the alloy in powder, or laminated into a thin plate at a dull red heat for a few minutes, and then raising the temperature so as to melt it when the fumes of the metallic chlorides have visibly diminished. In conclusion, I can only add, that a very little practice will enable any one in possession of a good balance to make assays of gold with the greatest accuracy. In a course of experiments, conducted at Guy's Hospital, in the presence of Mr. A. Aiken and other scientific gentlemen, a piece of gold was twice alloyed, and then purified by chlorine, without any sensible loss when weighed in a balance which readily turned with the one-hundredth of a grain.

The furnace which I employ for the process is made out of one of those pots employed for melting steel, and which cost about 1s. 6d. each. They are from 14 to 16 inches in height, and consist principally of Stourbridge clay and coke. Their form is rather peculiar, as the upper part is contracted so as to form a dome, as in the figure. They are so soft as to be easily cut with a knife and I have been thus far particular in describing them because the practical chemist will find them of great use in the laboratory for small furnace operations. One of these pots, then, is pierced near the bottom with four holes, at equal distances from each other and from the bottom, parallel to and between them, but about two inches higher up, another row of similar holes is placed, the whole of which holes should be from a half to three fourths of an inch in diameter; about three inches above these the sides of the pot are perforated with two larger holes of at least one inch in diameter. These must be diametrically opposed to each other, and upon the same level, i. e., at equal distances from the bottom. The furnace is now finished.

To assay gold, place an earthenware tube in the two upper holes, and light the furnace (a mixture of coke and charcoal answers best, though coke alone will do); when the tube is seen to be white hot, place it in the alloy contained in a little cupel made of bone-ash and push it along to the centre of the furnace by means of a wire, then connect one end of the tube with a bottle in which chlorine is forming from a mixture of peroxide of manganese and muriatic acid; the chlorine will consequently pass along the heated tube and over the melted alloy, with the silver, copper, &c., of which it will combine and leave the gold pure and untouched. During the process dense fumes may be observed to fill the tube, and when these are no longer produced the process is finished; the cupel may now be withdrawn, and the gold removed and weighed.

Description of Diagram.

[Pale 5. Fig. 5.] AA, steel pot. BBB, holes for the admission of air. CC, holes for the admission of the tube. DD, the tube placed horizontally in the furnace, containing—E, the cupel of gold. F the bottle in which chlorine is generated.

Report of Arthur Aiken, Esq. F.L.S. &c.

The experiments above alluded to as having been made in my laboratory, were conducted by Mr. Thompson himself under my inspection. The gold was obtained from an assayer, and was stated to be perfectly pure; but in many instances, on being subjected at a melting heat to the action of chlorine gas, a very small diminution of weight was observed, occasioned, no doubt, by the volatilisation of a little alloy, for the button of gold underwent no further dimunition whatever on a repetition of the process. The gold thus purified was mixed with silver and copper, or with silver and brass; and being put into a small porcelain tray, with a little chalk or common salt, was slidden cautiously to the hottest part of the tube. When the alloy was judged to be melted, chlorine gas was passed in at one end of the tube, the other either being left quite open or communicating with a small glass retort to collect the volatile products. A dense yellowish vapour almost immediately filled the tube, part of which concreted in filamentous crystals in the end of the tube; the remainder passed into the retort, lining it with a brownish yellow crust, or, if a little water had been put into the retort, producing a greenish liquor which, by the usual tests, was shewn to contain chlorides of

copper, zinc, and iron. The latter was, no doubt, derived from the ferruginous clay of which the tube was made, for the inside of it, after the process, was found to be nearly white.

On examining the contents of the tray, after the production of vapour had ceased, the button of gold was imbedded in a melted mass of chlorid of sodium (or chlorid of calcium, if chalk had been put into the tray) mixed with chlorid of silver, the presence of alkaline chlorid seeming to have the property of preventing the volatilisation of chlorid of silver.

In all the first trials, the button of gold was found to weigh considerably less than before the process, and the accidental breaking of one of the tubes shewed that in the part directly over the tray several globules of gold adhered, having probably been thrown up thither by the ebullition of the alloy when the chlorine was first passed over it. Having thus discovered the cause of the failure, the process was twice more repeated, taking care to give only a low red heat in the beginning, and to pass the chlorine slowly. With these precautions, the button of gold, remaining at the end of the process, was found to be exactly equal to its original weight as shewn by a balance that indicated well to the 1-200th part of a grain.

Trans. Socy. of Arts.

EXPANDING MANDREL.

The Silver Medal *was presented to Mr. John Hick, junior, of Bolton, Lancashire, for his Expanding Mandrel, for Turning Lathes.*

There are in the construction of steam-engines, mill-gearing, &c., a great number of parts, such as steps for plummer-blocks and other pedestals, also for connecting rods, cross-heads, &c., bushes for piston-rods and a variety of other parts which require their outer diameters to be turned true, or concentric, with the hole through them. The hitherto adopted mode of performing this, is by first taking a piece of iron whose diameter shall be a little larger than the hole through the article to be turned upon it, the piece of iron, which is usually called a Mandrel, is then turned down or reduced until it is of such a size as to admit of being driven tight into the hole for which it is intended, which being done, the article upon it is ready for turning; but this preparation often requires a longer time than is even occupied in executing the whole of the turning required upon the article for which the mandrel has been so prepared. To diminish this great loss of time, I have invented an expanding mandrel, a brief description of which, on referring to the annexed drawing, will shew its advantages.

I do not propose to make one mandrel take more than a certain range of holes; because if it were sufficiently strong for very large holes, it would be inconvenient for very small ones. I have therefore, adopted the following sizes, viz :—

$1\frac{1}{4}$	inch to expand to	$1\frac{3}{4}$*
$1\frac{3}{4}$	....	$2\frac{1}{4}$
$2\frac{1}{4}$	....	3
3	....	4
4	....	5
5	....	$6\frac{1}{2}$
$6\frac{1}{2}$	....	8
8	....	10

and in like proportion.

We have had some of these sizes in use in our own works about two years, and can speak confidently of their advantages, which effect a saving of the whole time required to prepare a common mandrel, and afford the facility of putting on or off any piece of work without damaging it, as is often the case with the common mandrel in driving on or off, particularly when the piece of work has been highly finished.

But its principal advantage is that of entirely doing away with the necessity of keeping a large stock of mandrels of the common description, amounting, in some large establishments, to four or five tons; and these, with the labour once put upon them, will be worth £600 to £700 : whereas mandrels on my improved plan to do the same work will not cost more than £100 for which sum two sets could be furnished including every size from $1\frac{1}{4}$ to 12 inches.

JOHN HICK.

[Plate 5. Fig.6.] *a b* the mandrel; the middle portion *c* is made conical and has four dove-tailed grooves *e* made in the direction of its length, which receive the four wedges *d d d d*; these are represented at their lowest place, so as to enter the smallest sized hole to which the mandrel is suited; the hollow clock *f f* represents the work, and is placed on the four wedges; these are followed by the hollow conical collet *g g*, and then by the screw

* I commence at $1\frac{1}{4}$ inch as that is the smallest size which I think would be generally useful.

nut *h* on the screw *b*. The cone *g*, when urged forwards by means of the nut, will drive the four wedges *d d d d* up the inclined grooves, and thus fix the mandrel quite tig[illegible]nd concentric into the hole in the [illegible] *f*; the collet *g* is made hollow in order that it may pass over the cone *e* and drive up the wedges *d* to any required distance. The dotted lines *d d d* represent the wedges at the extremity of their range within the limits of which the mandrel is adjustable to the smallest degree of difference in the inside diameters of various articles.

Fig. 7, is *a* view of the mandrel from the end of *b* without the conical collet *g* and nut *h*, the wedges *d* being pushed up to the largest diameter; *e e e e* the lower parts of the grooves in which they slide. Fig. 8, is a view of the large end of the cone *e* shewing the upper ends of the grooves *e e e e*. Fig. 9, an end view of one of the wedges.

The grooves *e* are cut with an engine so as to be perfectly concentric; the wedges are then fitted in and bound tight at the lowest place and there turned quite true and cylindrical; and by means of a smaller collet than *g* their ends may be turned true and flat; the collet *g* will then always advance them equally.—*Trans. Socy. of Arts.*

MACHINE FOR DRYING COTTON OR OTHER FIBROUS MATERIALS.

(*Robinson's Patent.*)

[Plate 6. Figs 1. 2. and 3.] This invention consists in certain arrangements of machinery, for drying fibrous materials, by exposing them to the action of currents of air.

One arrangement of machinery, for this purpose, is exhibited in figs. 1 and 2, Plate 6, fig. 1, being a longitudinal, and fig. 2, a transverse section. *a*, is a case or chamber, through which a shaft *b*, passes, carrying two revolving compartments *c*, *c*, for containing the goods to be dried; these compartments are closed at the sides, but their ends are open, and across them the bars *d*, are fastened, to prevent the articles from being forced out of the compartments, by the rapidity of their revolution.

In either side of the case *a*, near the shaft *b*, are openings *e*, *e*, for the admission of air, and in the ends of the case are other openings *f*, *f*, through which the air passes out; *g*, *g*, are apertures, in the bottom of the case, for the passage of the water or other fluid contained in the articles to be dried.

Motion is communicated to the shaft *b*, by a band from a steam-engine, or other prime mover, passing round the pulley *h*, on the end of the shaft; or by power derived from manual labour, applied to the handle *i*, and transmitted, by the wheel *j*, to the pinion *k*, on the other end of the shaft *b*.

The operation of this machinery is as follows:—When the fibrous materials are admitted through the doors *k*, and placed in the compartments *c*, the shaft *b*, is caused to revolve, and the air, entering at the openings *e*, *e*, passes through the compartments, and among the materials contained in them; but being forcibly ejected, by the rapid revolution, it passes out of the case at the openings *f*, *f*. Whilst the air is thus rushing through the revolving compartments *c*, the articles, contained in them, are constantly changing their position, and, by the force with which they are pressed against the outer bars of the compartments, the water or other liquid contained in them is expressed, and the remaining moisture is quickly evaporated.

Fig. 3, is a longitudinal section of another machine, for drying manufactured or unmanufactured fibrous materials. In this machine, the case *a*, and openings *f*, *f*, and *g*, *g*, are the same as before; but, instead of two revolving compartments *c*, *c*, for receiving the articles to be dried, a rotary wheel *l*, is employed, divided into four compartments by bars *m*, each compartment being provided with a door *n*, for the admission of the goods. The air enters the case by the holes *o*, *o*, near the shaft *b*, and rushing through the compartments, passes out at the openings *f*, *f*, as before.

The patentee claims the mode of constructing machines, for drying cotton, wool, and other fibrous materials, in a manufactured or unmanufactured state, as described.—*London Journal.*

EVAPORATION OF SEA WATER &c. AND MANUFACTURE OF SALT.

(*Edward Law's Patent.*)

[Plate 6 Figs. 4, 5, 6, 7 and 8.] To all to whom these presents shall come, &c., &c.—My said invention is chiefly applicable to the evaporation of sea-water and other fluids containing a large portion of water, as the weaker salt springs, for instance, and which at the present low price of salt, renders them inapplicable to the manufacture of that article.

Now, my improvements consist in the application of machinery, by means of which I can evaporate the water in a cheaper and more speedy manner than has hitherto been effected. This I perform by exposing the sea-water or other fluids on an extensive surface, to the action of a brisk current of atmospheric air, by means of horizontal machines, which can be easily turned and put into rapid circulation, or by means of the currents of air so produced.

In either of these ways I am able to evaporate a much greater quantity of water at a smaller expense, and in a less time than could be effected by any of the usual methods, and thereby to make salt from sea-water and the weaker salt springs, with economy and despatch. I can likewise evaporate other fluids containing large quantities of water with great advantage, by the use and application of similar means; and I do hereby claim this method of evaporating water or other fluids as a new principle, and likewise all its various applications. As, however, it is desirable to afford examples of carrying my said invention into effect, I shall proceed to do so by referring to the figures contained in the drawings which, as aforesaid, are annexed to this specification.

In drawing [Fig. 4] A, A, represents an upright shaft or axis, carrying ten frames, B, B, B, B, B, B, B, B, B, B, as shown in the horizontal plan of it, Fig. 5. Upon these frames, sheets, or wings, of strong canvass or other suitable materials, are affixed as shown on one side of fig. 4, at D. The sea-water or other fluid is dispersed all over the surfaces of the wings by means of pipes, D, D, fig, 4, and D, D, D, D, D, D, D, D, D, D, fig. 5, with holes on their undersides, which proceed from a central funnel, E, which is supplied by means of a pipe, *f*, with a regulating cock, which descends from a pipe, G, G, connected with the tank or upper reservoir of sea-water or other fluid. The lower or bottom hardened steel pivot, H, fig. 4, of this upright shaft, A, A, is made flat underneath, and rests or is supported upon a convex or somewhat rounded surface of hardened steel, which is mounted in a cast-iron chair or oil reservoir, and which likewise has a cylindrical hole in its cover, accurately fitted to the cylindrical bottom pivot; and by this contrivance it turns with very little friction indeed, and is constantly lubricated with the oil contained in the cast-iron chair. In order to prevent the entrance of the sea-water or other fluid into the oil vessel, it is furnished with a hood or cover, in the manner shown. The upper or top pivot, I, of the upright shaft, A, A, is formed by means of a hardened steel cylindrical stem, which descend from the underside of the beam, J, J, to which it is affixed by means of screws into a cast-iron oil cup, K, mounted upon the upper end of the shaft, A, A, and having a cylindrical hole in its cover, which is accurately fitted to the cylindrical stem, I. Oil being put into the cup, the upper pivot thus formed is constantly lubricated, and indeed it is continually surrounded with oil. A swift motion may be given to this upright set of frames, either by means of a band and pulley, as shown, and which must be actuated by any of the well-known first movers of machinery or by toothed wheelwork, or in any other fit and proper manner. I thus expose the sea-water or other fluid whilst descending the wings, C, C, &c.; and in a widely diffused state, to a rapid current of air, produced by their swift circular movement, and thereby effect a quick evaporation of the water contained therein Nor is this all, for, having thus created a rapid current of air by the swift revolutions of the upright machine and its wings, I can avail myself thereof by placing around it upright frames, supporting hurdles or frames, covered with strong canvass or other suitable materials, and arranged in the zig-zag manner shown at fig. 8, at P, P, P, P, P, P, and thus the seawater and other fluid thrown off by the centrifugal action from the wings in a partly concentrated state, will be again exposed to the action of a rapid current of air, and become still more concentrated. I can likewise pour fresh supplies of sea-water or other fluids down these fixed frames of hurdles or frames, covered with canvass or other suitable materials, with a very considerable evaporating effect produced as above, in addition to the sea-water or other fluid thrown off the revolving wings of the machine. I can likewise evaporate sea-water and other fluids in the manner shown in figs. 6 and 7, where the upright shaft or axis, A, A, is shown, in the manner of that shown in figs. 4 and 5; but instead of being furnished with frames and wings, it has several metal circular cupped discs, L, L, L, L, L, L, L,

fig. 6, and, L, fig. 7, affixed upon it from top to bottom, and which are also supported between upright standards, M, M, M, M, and upon arms, N, N, at the bottom of the shaft or axis, A, A. The outward rims of the discs, L, L, are turned inwards, as is shown. Holes are made in all these discs at corresponding distances apart in each, as shown in fig. 7 ; and through these holes, cords, lines, or ropes are passed from bottom to top, and either in a circular order, as is generally shown, or in radial lines as in those shown at a, in fig. 7. These cords, lines, or ropes must be well secured above and below. The sea-water or other fluid to be evaporated is to be delivered into the uppermost disc, L, fig. 6, by the pipes, P, P, which descend from the main pipe, G, G, and enter a horizontal pipe, Q, which has holes made along it, and disperses the sea-water or other fluid all over the upper disc, when it is rapidly turned beneath it, and is passed through the holes made in all the discs, and down all the cords, lines, or ropes, to the bottom, all the while exposed to the evaporating action of the atmospheric air in its passage, and which is greatly increased by the rapid movement of the cords, lines or ropes through it, and passes off below in a greatly concentrated state. This machine does not indeed produce a rapid circulation of the air surrounding it in an equal degree with the machine described, in reference to figs. 4 and 5 ; but then it can be moved with less power than is requisite to actuate that machine. In either of the machines, should the sea-water or other fluid not be sufficiently concentrated on passing down them once, it will be received in the channel, R, and conveyed to a reservoir, from whence it may be raised by a pump or otherwise, to an upper reservoir and then again be subjected to the evaporating action of the machines, as often as is found necessary to bring it to a proper state of condensation to be conveyed into the boilers or evaporating pans of the salt-works.

Having thus described the nature of my said invention and several modes of carrying the same into effect, I hereby declare that my improvements consist in exposing sea-water or other fluids, in a state of extended diffusion, to the action of currents of atmospheric air by mechanical action, and in the methods herein shown and described. —In witness whereof, &c.—

Rep. Pat. Inventions.

NEW BUCKET FOR RAISING WATER TO BE USED IN PUMPS.

Abstract of specification of Mr. Emsfie's Patent.

[Plate 6. Figs. 9, 10, 11 and 12.] My invention relates to a mode of raising, lifting, or forcing water, or other liquid, whereby I am enabled to effect a great saving in the use of steam, or other power, as well as of fuel, where fuel is applied. In pumps, in which buckets are used, my invention or improvement consists in a new bucket, which is described in fig. 10 and parts of it in figs. 9, 11 and 12. Fig. 9 therein represents a vertical section, through the centre of a pump barrel of one of my new buckets, made with four leaves or floats. *a a* are sections through the centre of two smaller leaves or floats, of each of which a representation, in a horizontal position, is given in fig. 11, *d* is one of two larger leaves or floats, resembling each other, of which a representation, in a horizontal position, is afforded by the drawing, J, in fig. 12. These larger leaves or floats, exceed the smaller leaves or floats in size, by only the thickness of the material of which the smaller leaves or floats are composed, so that they may under-lap the smaller leaves or floats, as represented at *k k*, in fig. 10, the smaller leaves or leaves therein being marked *a a*. *b*, *b*, are projections on the smaller leaves or floats, *a a*, to prevent the smaller leaves or floats, after they have been raised up by the depression of the bucket, from clinging to the rod *c*, and thus preventing the action of the bucket on its upward stroke. The four leaves or floats are cut through as represented at *u*, in figs. 9, 11 and 12, in order to form a hinge with *e*, in figs. 9 and 10, which is a clamp for hinging the leaves or floats, and connecting them with the rod *c*. For this purpose, the clamp *e* is curved at the ends, or hollowed out in a concave form on the underside, so as to fit and form a hinge, with the convex part of the aperture, *u*, made in the floats or leaves. The clamp *e* has also an aperture, coinciding in the bass *g*, in the centre, through which the rod, *c*, passes ; and that rod is wormed as a screw at the bottom, and on this screw a nut works, which nut, by being screwed upwards, brings the clamp, *e*, close down upon the hinged part of the leaves or floats, and secures them tightly in their position, permitting them, however, to play upon the hinges. At the points where the leaves or floats are cut through, a plate, *f*, is

secured to the back or underside of the aperture, as represented in figs, 9, 11 and 12. The floats or leaves may be set up at any angle, but that at 45 degress will generally be found best; and in ordinary lifts, during the upward stroke, they rest against, and are entirely supported at the top, by the sides of the barrel, in which case the boss, *g*, may be round or square, or any other convenient form. In higher lifts, however, in order to take off a portion of the pressure from the sides of the barrel and the hinges, arms are extended, as shown in fig 9; and by the dotted lines in fig. 10. through which the screws, *h h*, work, and by means of blocks (which, in that event, must be cast on or cut out of the backs of the leaves or floats) afford them support. If such supports are applied only to some of the leaves or floats, the same should be applied to the larger leaves or floats, and the screws will enable the leaves or floats to be lowered, and thus expanded at the outer edges, to supply any slight diminution occasioned by wear, or adapt them to a barrel somewhat varying in dimensions. Where a great vibration of rod cannot be avoided, it will be necessary to put the rod *c*, of the bucket in guards, either at the top or bottom of the stroke, or else to affix a hoop to the bottom of the rod, *c*, which hoop should be the size of the barrel. The bucket, as above described, may be made entirely of metal, wood, or other suitable substance, and I recommend the above mode of hinging the leaves or floats although other methods may be adopted with efficacy. I do not confine myself to any particular number of leaves or floats, which may be varied according to circumstance. In manufacturing the bucket, after the leaves or floats are hinged upon the boss, I recommend that a mandril should be driven through the hole in the boss, having a screw thread with nuts working thereon on each side of the boss, in front of each of which screw threads are to be placed, with arms, radiating to a plane, passing through the centre of the bucket; so that, by applying the nuts, the leaves or floats may be fixed to any angle, and, when put in the lathe, turned up to fit the pump-barrel accurately. Fig. 10 represents a horizontal section through a pump-barrel, with a view of the upper side of the bucket. The same letters in figures, 9 and 10, represent similar parts. The dotted lines, *e, e, e, e*, show the formation of the boss, *g*, under the leaves or floats. Fig. 11 represents one of the smaller leaves or floats, with a horizontal and vertical section, and the lines for geometrically describing the same. The chord of the arc, *i i*, is of the same length as that at *i i*, fig. 10; and the traverse sine of the arcs, *j j*, is obtained by drawing a line at an angle of 45 degrees, from the sine of the arc, *j j*, in fig. 10. Fig. 12 represents one of the larger leaves or floats, with a horizontal and a vertical section, and the lines for geometrically describing the same. The chord of the arc, *k k*, is of the same length as as that of *k k*, fig. 10, and the transverse sine of the arc is obtained as described in fig. 10. This bucket can be applied to all sorts of pump-barrels, without any alteration of the barrels. There is no friction in the downward stroke, by reason of the leaves or floats being pressed by the action of the fluid, and folding towards the rod, *c*; and on the upward stroke the friction is at a *minimum*, by reason of the thinness of the edges. Where sand or other substances abound in the fluid, the wear and tear will be less than that occasioned by the bucket now in use. My bucket cannot well choke; for, even should a portion of the rubbish, or other substance, get between the leaves or floats, a slight reversion of the stroke will displace it, bringing the rubbish or other substance up to the surface, when it will be projected with the fluid. As regards this part of my invention described above, I claim, as my invention, the formation of buckets for pumps, whether made of metal or other substance, in the form set forth, not limiting myself to any particular number of leaves or floats, or the method by which they may be hinged, or the angle at which they may be set up, and the use thereof in all kinds of pumps, for the raising, lifting, or forcing of water or other liquid.—

Mining Journal.

SCREW BENCH HOOK FOR CARPENTERS

[Plate 6. Figs. 13, 14, 15 and 16.]

For which the Silver Isis Medal was presented by the "Society for the encouragements of arts" to the inventor. Mr. F. E. Franklin.

[Mr. Franklin states, that having experienced great inconvenience, as we believe every workman before him has done, in the use of the old Bench stop for Carpenters, he contrived the following stop, regulated by a screw, thereby a-

voiding the unpleasant hammering which is injurious to unfinished work lying on the Bench, and at the same time being enabled to adjust the stop with greater nicety.]

[Plate 6.] Fig. 13, is a top view of the hook A A, B, and socket C.

Fig. 14 is a front view, the bench only in section.

Fig. 15 a side view in section.

Fig. 16 top view of the socket C and its place DD.

A A. the hooks screwed to the square iron slide BB, this is fitted to the socket CD, in which it can slide; the front part E, of the socket is made to spring against it, so as to allow it to slide freely without shake.

The socket C is fitted tight into the bench E from the underside, having a flanch D to stop it, by which it is screwed to the bench; the slide B is hollow and receives the screw F; the shoulder of the screw abuts against the iron strap GG, through which its neck passes and receives the collet H, below which it is squared into the handle I, and bound tight by the screw-nut J. With this arrangement the hook and slide AB, may be either raised or depressed by turning the screw F. It will be seen that the front or springing portion E of the socket is made sufficiently low to admit of the hook being drawn down rather below the bench when necessary, and the top of the socket C is made a little short of the bench surface.

Trans. Socy. of Arts.

IMPROVED GLAND-BOLTS FOR SUGAR MILL STANDARDS.

[Plate 6, figs. 17 and 18.] Sir,—I send for the inspection of your readers, but more particularly such of them as are connected with sugar machinery, the accompanying sketches of an improved method of constructing the gland-bolts for sugar-mill standards, and placing them in such a position as to give the greatest possible strength, without increasing the weight of material. Another advantage attending this improved position, is that the line of strain is always parallel with the gland-bolt, in consequence of which, the frequent breakages which occur, and the delay consequent upon them, are entirely prevented. The gland-bolts are provided with universal or self-accommodating washers which keep the nuts in their proper position at whatever angles the gland-bolts may make with the cap or gland.

I am, Sir, your obedient servant,

G. Fletcher, Engineer.

Brook-street, Lambeth, May 30, 1841.

Description of Engravings.

A A. sugar-mill standard; B, cap or gland for ditto; C C, the improved glandbolts; D D, the universal washers, one of them shown in section; E E, nuts of gland-bolts; F F, bolts for attaching the gland-bolts to the lower part of standard.

Mech. Mag.

RODWAY'S HORSE SHOE.

[Plate 6. Figs. 19 and 20.] This invention has for its object, the formation of a shoe, which will secure a firm foot-hold to horses, on all kinds of pavements, and be, at the same time, lighter, and remain longer on the foot than shoes now in use. It consists in forming the shoe of bar-iron, not less than three-quarters of an inch wide, in which a grove at least three-eights of an inch in width, has been formed, by rolling.

In Plate 6., fig. 19, is a view of the under side, and fig. 20, a section of the improved shoe. *a*, is the groove, in which holes are made for the nails that secure the shoe on the horse's foot; *b*, and *c*, are the outer and inner edges of the shoe, the former being higher, and twice as abroad as the latter. It will be seen, that as the heads of the nails do not come in contact with the ground, being protected by the raised parts *b*, and *c*, there is less chance of the horse casting this shoe than an ordinary one.

The patentee claims the mode of manufacturing horse-shoes, by employing bar-iron, rolled with a groove therein, at least three-eighths of an inch wide, and in a bar at least three-quarters of an inch wide, as above described.—

London Journal.

THE TELLURIUM. AN ASTRONOMICAL MACHINE BY EDWIN C. LEEDOM, M. D. OF PLYMOUTH, PENN.

This is a machine for representing the motions of the earth and moon. The earth, whose axis has its proper obliquity to the ecliptic and keeps its parallelism, revolves round the sun in an ellipsis similar to the natural orbit, and moves with such a velocity that an imaginary line joining the centres of these two bodies, the latter being situated in one of the foci of the orbit of the

former, describes equal areas in equal times. The diurnal rotations of the planet are also shown, each complete turn on its axis being made in a sidereal day, or 23h. 56m. 4s. The moon moves eastward round the earth and completes a sidereal revolution in 27d. 7th. 43m.; its nodes shift round contrary to the order of the signs, and its apogee has its direct motion eastward, the former completing a sidereal revolution in 18.6 years, and the latter in 8 years and 17-20ths.

In contriving this machine I have availed myself somewhat of the inventions of other artists. To effect the unequable motion of the earth in its orbit, I have had recourse to a combination of elliptical wheels similar to that used by Dr. Desaguliers in his Cometarium. There is a little Planetarium described in Ferguson's Astronomy, in which the parallelism of the earth's axis is preserved in the same manner as in this. But this machine, independently of the elliptical orbit and unequable motion of the earth, is very different from that, as will be apparent to any one who may compare them*. (See Brewster's Ed. Ferg. Astron. Vol. II. p. 6.) Although these particular parts are the inventions of preceding artists, still I think I may venture to assert, that this machine, considered as a whole, constitutes a new combination in mechanics.

In Plate 7, this machine is represented as represented as it would appear to an eye situated directly above it. Plate 8 exhibits a lateral view of the wheelwork. In either plate the ball W represents the sun, the ball U the earth, and V the moon. *k* is an index for showing the place of the moon's ascending node, *e* is another index for showing the place of its apogee, and *n* is a winch by which the machinery is moved. The earth is surrounded by a little brass ring *s*, which is set upon four pillars *t t*, and has the signs of the zodiac marked upon it. Upon this ring, which moves with the earth and keeps its parallelism, the geocentric places of the sun, moon, its ascending node and apogee, can be seen. 1 2 3 4, Plate 8, is a wooden frame, in the top of which are two equal elliptical grooves similar to the earth's orbit, and which have their foci all situated in one straight line. Within the frame are two elliptical wheels, K and L, which are of the same size and eccentricity as these grooves, each wheel having its axis situated in one of its foci. The axis of the wheel L also carries a large circular wheel M.; next to which is placed a pinion N, upon the upper end of whose axis the winch *n* is fixed. Q is a stout metallic axis of the same size as that which carries the wheel K. These two axes pass perpendicularly through the boards 1 and 3, the upper part of each axis where it comes through the board 1 being situated in one of the foci of one of the elliptical grooves. Upon the upper ends of these axes two arms *h* and *i* are tightly fixed. Two other arms R and S are fixed upon their lower ends so as to be perpendicular to *h* and *i*. T is a narrow metallic plate which is connected with the arms R and S by two movable joints: this plate assists in regulating the motion of the machine. Into the arms *h* and *i*, are inserted two axes *f g*, which pass up through a moveable frame 5 6 7 8 and freely within it. The lower ends of these axes project into the elliptical grooves in the board 1 and slide along these grooves when the machine is in motion, the arms *h* and *i* being so contrived as either to lengthen or shorten according as the distance of the groove from its focus increases or diminishes.

The movable frame 5 6 7 8 contains a number of wheels, which serve to rotate the earth on its axis and give motion to the moon, its nodes and apogee. A metallic supporter Y has inserted into it a long and narrow socket, which passes up through a hole in the plate Z. Upon the upper end of this socket a small brass arm *a* is fixed, which holds a pinion *o*, whose axis forms an angle of 23½ degrees with the perpendicular, and carries the earth U. C is a pinion whose axis passes up through this socket and is surmounted by a very small wheel whose teeth act upon the leaves of the pinion *o*. D, F, and H, are three wheels, each of which is fixed upon a separate socket. The socket of the wheel D turns upon the socket which is fastened into the supporter Y. The socket of F turns upon the socket of D; and the socket of H. turns upon that of the wheel F. Upon the upper end of the socket of D a small circular brass plate *c* is fixed, into which, near its edge, is inserted

* About fourteen years ago I made the first machine of this kind. At that time and for several years after, I believed myself to be the original inventor of this mode of preserving the parallelism of the earth's axis, but I was at length undeceived by a perusal of Fergusson's book.

a small flattened socket, through which passes a flattened wire which carries the moon V. The lower end of this wire rests on another circular plate *d*, which is fixed upon the socket of the wheel F and has an oblique position, forming an angle of 5⅓ degrees with a horizontal plane passing through its centre. This wire is kept constantly applied to the plate *d* by means of its own gravity, and slides along this plate as *c* turns round, the wire alternately rising and falling in its socket; consequently the orbit in which the moon V moves must always be parallel to the plate *d*, and form an angle of 5⅓ degrees with the plane of the ecliptic. The index *e*, which points to the moon's apogee, is fixed upon the socket of the wheel H. The axis *g* carries four wheels A, E, G, and I, which all turn as one wheel. Next to the wheel A is placed the pinion of a wheel B, whose teeth act upon the teeth of a small wheel *p*, which transmits motion to the pinion C. The teeth of the wheel E act upon the teeth of the wheel O, whose axis also carries a wheel P, which gives motion to the wheel D. The teeth of the wheel G act upon the teeth of the wheel F; and lastly, motion is transmitted from the wheel I to the wheel H by means of an intervening wheel *r*.

When the winch *n* is turned by a steady hand, the leaves of the pinion N act upon the teeth of the large circular wheel, M, and turn it and the elliptical L on their common axis with an equable motion. The teeth of L at the same time act upon those of the wheel K. As K turns, the arms *h* and *i* both move in the same direction and carry the movable frame 5 6 7 8 parallel to itself over and over the top of the large stationary frame 1 2 3 4. The earth U is carried along with the moving frame, and has the parellelism of its axis also rigidly preserved. As the ends of the axes *f* and *g* slide round in the elliptical grooves, in the board 1, it is apparent that the orbit described by the earth U, must be an ellipsis of the same size and eccentricity as either of these grooves. When the earth is in its perihelion, as represented in the drawing (Plate 8,) that part of the circumference of the elliptical wheel L, which is farthest from its axis and has the greatest velocity, is applied to a part of the circumference of K, which is nearest to the axis of the latter wheel, consequently the earth must have its quickest motion. When the earth comes to its aphelion, these elliptical wheels have a reverse position with respect to each other, which gives the earth its slowest motion. These elliptical wheels working together in this manner, give the earth U the same unequable motion in its orbit, that the real earth has in nature,

The wheels A, E, G, and I, all make one complete turn on their common axis *g* during an entire revolution of the earth round the sun. The wheel A contains 293 teeth, and the pinion which belongs to the wheel B contains 8 leaves, consequently B must make 36⅝ turns during one turn of the wheel A. The wheel B contains 80 teeth, and the pinion C contains 8 leaves; consequently C must make ten turns during one turn of the wheel B, and ten times 36-5-8ths or 366¼ turns during one revolution of the wheel A, that is, in one year. The little wheel upon the upper end of the axis of the pinion C contains the same number of teeth as the pinion *o*, therefore the earth must turn on its axis in the same time as the pinion C; it must make 366¼ diurnal rotations in a year, each rotation being performed in a sidereal day or 23h. 56m. 4s. The wheel E contains 167 teeth, and the wheel O contains 25 teeth. Consequently O, and also the wheel P, must make 6 17-25ths turns during one turn of E. The wheel P contains 72 teeth and the wheel D contains 36 teeth, consequently D must make two turns during one turn of P, and twice 6 17-25ths or 13 9-25ths turns during one turn of the wheel E, or in one year. As the circular brass plate *c* is fixed upon the socket of the wheel D, this plate must turn with the wheel and carry the moon V 13-9-25ths times round the earth U in a year, which is equal to the number of the moon's sidereal revolutions in this time. The teeth of the wheel G act upon the teeth of the wheel F. The wheel G contains 20 teeth, and the wheel F contains 372 teeth, consequently G must make 18 6-10ths turns, while F turns once round. As the wheel G makes but one turn on its axis in a year, the wheel F must require 18 years 6-10ths to perform a revolution. The oblique plate *d*, to which the moon's orbit is parallel, being fixed upon the socket of the wheel F, the plate must turn with this wheel and carry the moon's nodes round contrary to the order of the signs, so as to perform a sidereal revolution in 18 years 6-10ths. The teeth of the wheel I act upon the teeth of the wheel *r*, which, as before stated, transmits motion to the wheel H. The wheel I contains 20 teeth, and the wheel H contains 177

teeth, consequently I must make 8 17-20ths *turns in order to turn F round* once. As the wheel I makes only one turn in a year, the wheel H must be 8 17-20ths years in performing a revolution. The index *e*, which is fixed upon the socket of H, must turn with this wheel and also perform a revolution in 8 17-20ths of a year, which is the time in which the moon's apogee performs a sidereal revolution ; therefore this index will show the proper motion of the apogee.

This machine being rectified by the astronomical tables for any particular time, if the winch *n* be then turned from right to left, the machine will exhibit the vicissitudes of day and night, variety of seasons, new and full moons, eclipses, anomalies of the sun and moon or year after year.

As the earth has the same unequable motion in its elliptical orbit that the real earth has, this machine will show the sun's true place correctly for a great length of time.

A table showing the dimensions of the wheels of the Tellurium, number of teeth, &c.

Wheel A, 293 teeth, 12 teeth in an inch of circum. Diam. 7.77 inches.

Wheel B, 80 teeth, 8 teeth in an inch of circum. Diam. 3.18 inches.

Pinion of wheel B, 8 leaves. Diam. 21-100ths of an inch.

Wheel *p*, 24 teeth, 8 teeth in an inch. Diam. 95-100ths of an inch.

Pinion C, 8 leaves. Diam. 31-100ths of an inch.

Wheel E, 167 teeth, 8 teeth in an inch of circum. Diam. 6.64 inches.

Wheel O. 25 teeth, 8 teeth in an inch. Diam. 99-100ths of an inch.

Wheel P, 72 teeth, 8 teeth in an inch. Diam. 2.86 inches.

Wheel D, 36 teeth, 8 teeth in an inch. Diam. 1.43 inches.

Wheel G, 20 teeth, 12 teeth in an inch of circum. Diam. 53-100ths of an inch.

Wheel F, 372 teeth, 12 teeth in an inch. Diam. 9 86-100ths of inch.

Wheel I, 20 teeth, 8 teeth in an inch of circum. Diam. 79-100ths of an inch.

Wheel H, 177 teeth, 8 teeth in an inch. Diam. 7 4-100th inches.

Wheel *r*, 40 teeth, 8 teeth in an inch. Diam, 1 59-100ths inches.

Elliptical wheels K and L. The longer diameter of each wheel, 10 inches, Distance between the two foci 17-100ths of an inch. Both of these wheels contain the same number of teeth.

Wheel M, 280 teeth, 8 teeth in an inch. *Diam. 11 14-100ths inches.*

Pinion N, 16 leaves.

Elliptical grooves in the board I. The longer diameter of each groove, measuring from the middle of the groove on one side to the middle of the groove on the opposite side, 10 inches. Distance between the 2 foci 17-100ths of an inch.

Amer. Jour. Sci. & Arts.

PATENT GUIDE SCREW STOCK.

Messrs. Whitworth, of Manchester have introduced a new guide stock, which will cut a screw but little inferior to that obtained in a slide lathe ; the thread produced is quite true, of the exact pitch required, and perfectly formed throughout, without distortion of the metal ; the defects of the old stock are quite avoided. The plan is simple, but perfect ; in the frame of the stock is a fixed die, forming, by a division, two parts of the cutting threads ; at proper distances are two moveable dies, brought up or down by means of *one* screwnut on the outside of the stock, and thus regulating the size of the tap ; this invention will place a perfect screw-cutting machine in the hands of many who could not obtain screws from the lathe without much trouble, and yet whose peculiar works requires them of the nicest formation. *Mining Journal.*

ARTESIAN WELL.

It is perhaps not generally known that an Artesian well is now, and has been for some time, in progress at Chichester, which, like the well on Southhampton-common, is now sunk to upwards of 900 feet in depth, without obtaining anything like an adequate supply of water for the use of the town. This well has been carried down through the chalk, through a bed of clay, or marl, beneath it, and is now sinking in a hard solid rock, probably the corresponding or similar bed to the Purbeck stone, with which we are all familiar, and which is one of the beds of green sand, or galt formation, which lies under the chalk. The Southampton well is now altogether about 950 feet deep, 450 feet of which is in the chalk. The chalk is probably 1000 feet deep at Southampton, in which case there will be upwards of 500 feet to sink to get through it, and what then—clay or marl, hard rock, &c. ! *Mining Journal.*

METEOROLOGICAL TABLE, KEPT AT DINAPORE, FEBRUARY, 1843.

Days.	Moon's Changes.	Self registering Thermometer. Minimum.	Thermometer, in the shade. Sunrise.	9 A. M.	Noon.	3 P. M.	Sunset.	9 P. M.	Daily range of Thermometer.	Difference between wet and dry bulb Thermometer. 9 A. M.	3 P. M.	Winds. A. M.	P. M.	Remarks. Night. A. M.	P. M.
														Night dew and fog.	
1		53	54·3	60·3	65·6	68·6	66·5	60·8	15·6	4·5	6·5	W.N.W.	W.N.W. light.	Clr.& fine. N. dew and fog.	Light clouds.
2		53	54·7	61·3	66·5	68·7	66·8	62·5	15·7	4	9·5	W.N.W.	,,	Clr.and fine.night dew.	Clear and fine.
3		53	55	62	66·9	68·7	66·7	...	15·7	4·5	7·5	W.N.W.	,,	Clear and fine.	Light clouds.
4		52·5	54·5	61	66·5	68·8	66·7	62	16·3	5·5	8·5	W.	N.N.W. light.	Ditto. Light dew.	Clear and fine.
5		52	54·3	61	66·8	68	66·7	58·8	16	6	9	W.N.W.	Light.	ditto.	ditto.
6		50	53·5	61·5	66·5	68·5	66·7	61	18·5	7	11·5	W.N.W.	,,	ditto.	ditto.
7	☽	51·5	53.5	63·5	68·3	70·1	...	...	18·6	6	12·5	W.S.W. light.	N.N.W. light.	ditto.	ditto.
8		54	55·8	64	69·8	74	72·4	67·8	20	5·5	17	W.	N.N.W. strong.	ditto.	ditto.
9		51·5	55	64·6	71·9	74·2	72·3	66	22·7	9	14	W. strong.	N. strong.	Light clear.	Light clouds.
10		53	55	64·3	69·8	72·8	68·5	65·5	19·8	11	14·5	W.	,,	Clear and fine.	Clear and fine.
11		52.5	54·7	63·5	71	72·7	67·7	60	20·2	9·5	14	W.	W.N.W.	ditto.	ditto.
12		51·5	53·9	63·6	70	72·5	67·6	63·9	21	8·5	14·5	W.N.W.	N.W.	ditto.	ditto.
13		52	55·4	64	70·5	74	...	62·8	22	9·5	14·5	W.S.W.	W.N.W.	Ditto. Night Dew.	ditto.
14		51·5	...	61	69	71·8	69	64·8	20·3	7.5	10·5	N.E. light.	N.E. light.	Ditto. and Dew.	ditto.
15	○	55	57·3	64·1	70·6	72·6	...	...	17·8	5·5	.4	E.	N.E.	Light clouds.	Light clouds.
16		60	61·3	67·5	71	72·4	72·2	68·3	12·4	6	10·5	E.	E. light.	ditto.	Ditto, rain at night.
17		62	63	67·5	74	74	...	65·1	12	3·5	8·5	E. light.	E.	Thunder storm and rain at sun-rise.	night dew
18		54	54	62·6	70·9	72·7	...	61·3	18·7	4	13	W.	W. strong.	Clear fine.	Clear fine.
19		51	52	61·8	69·8	71·8	...	59	20·8	8	13	W. light .	N.N.W.	Light clouds. Dew.	ditto.
20		51	51·6	62·8	69·5	73	68	60·3	22	7·5	14·5	W.	N.N.W.	Clear fine.	Light clouds.
21	☾	53·5	53·8	64	71·8	74	70	60·6	20·5	8·5	15	W.	W.N.W.	Light cloud.	ditto.
22		52	52·2	62	71·9	73·9	68·5	61·7	21·9	8	14	W.N.W. light.	W.N.W.	Clear fine.	Clear fine.
23		53·5	54·3	65	70	73·8	70	67	20·3	9	12·5	W. light.	N.E. light.	ditto.	ditto.
24		62	63	66·5	70·6	72	70·5	...	10	4·5	8	N.E. light.	E.	Thunder storm and rain.	Dark and cloudy.
25		60·5	61	65·8	71·4	72·7	71	66	12·2	4	6	E.	Strong.	Dark and cloudy.	Cloudy.
26		61	62·6	66·9	72	75·4	72·8	67	14·4	4	7·5	E.	Light	Lt. clouds night dew. and fog.	ditto.
27		59·8	59·7	67·9	73·8	76·4	...	67·6	16·9	4	10·5	N.N.W. light.	W.N.W.	Light clouds.	Light clouds.
28		61	61·7	69·2	74·7	76·1	75	68·5	15·1	7	11·5	W.	N.N.W.	ditto.	Cloudy.
Mean		54·5	56·1	63·9	70	72·3	69·2	63·6	17·4	6·4	11·5				

Minimum .... 54·5
Medium.. 63·6
Maximum .... 72·3
Of ... hours.. 64·2

S. M. Ll.
Dinapore, 1st February, 1843.

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MARCH.] —o— [1843.

BIOGRAPHICAL SKETCHES.

The Venerable Thomas Dealtry, L.L.B.

Archdeacon of Calcutta.

(WITH PORTRAIT.)

How awfully responsible is the office of God's ministry !

"Son of man, I have made thee a watchman unto the house of Israel : Therefore hear the word at my mouth and give them warning from me. When I say unto the wicked, thou shalt surely die ; and thou givest him not warning, nor speakest to warn the wicked from his wicked way to save his life ; the same wicked man shall die in his iniquity ; but his blood will I require at thine hand. Yet, if thou warn the wicked and he turn not from his wickedness, nor from his wicked way, he shall die in his iniquity ; but thou hast delivered thy soul."—Such faithful watchmen who have not failed to sound aloud the warning trumpet in modern times have been men like unto Baxter and Wesley. The former by his zeal and faithful service to his omnipotent master, turned, in most of the habitations of Kidminster, the voice of cursing and swearing into one of singing of hymns and earnest and fervent prayer. This wonderful revolution was effected by his personal attendance at the residence of every one of his parishoners, exhorting and persuading them not to die in their iniquities ; while the latter produced the same marvellous change in the lives of millions throughout the whole of England, by his bold and eloquent appeals to the consciences of his hearers, in the open field and market places; and such fervent and fearless preaching have marked the earnest and faithful conduct of the eminent subject of our present sketch during his ministry in India.

Thomas Dealtry, Archdeacon of Calcutta, was born at the conclusion of the last century. His parents sought to bring him up according to the scripture direction, in the nurture and admonition of the Lord ; and like many others he was much indebted to the counsels, instruction, and example of a pious mother. He has been heard to express himself as incapable of ever repaying the debt of love and gratitude he owes her. It was not, however, until after the death of that pious parent that his views of the great and leading truths and requirements of the Gospel, became clear and distinct, and his mind impressed with the solemn obligations of his baptismal covenant. It was over the grave of that parent, as one of the means that was blessed under God, which led to repentance and serious consideration. This was strengthened and carried on by the pious advice and still more pious example of a beloved sister.

We have heard that through his love of the Scriptures and his careful study of them at this period his views became strengthened and enlarged. He saw and lamented the total depravity of the human heart in reference to God,—the suitableness of the Gospel salvation,—its perfect adaptation to man's wants and necessities as a sinner. He beheld in that Gospel the full vindication of the Divine righteousness, whilst it provided pardon peace and holiness for the penitent believer ; under these believing views of the Gospel, he was led to look up to God as a reconciled Father in Jesus Christ His Son, and to depend upon the influence of the Holy Ghost for that sanctification and meetness for Heaven which are as necessary for a pardoned sinner as his justification from the condemnation of the law. These views we believe have been the ground of his faith and hope from that time to the present.

Impressed with the earnest desire to proclaim the glad tidings of salvation to his fellow creatures, he turned his attention to the sacred office of the ministry. For this purpose he entered his name at the University of Cambridge in the year 1822.

Circumstances prevented his going to reside for sometime, and in the meanwhile he sought ordination without having to go through the previous College studies—but failed to effect his purpose. We believe that he is now thankful that he did so, both from the great advantage derived from a College life, and from the connections he there formed.

He was not able to go up to residence at Cambridge before the year 1825, when he became a fellow commoner of Catherine Hall. His intention was to have gone out in the usual mathematical tripos and he read for that purpose during the first year of his residence. Finding, however, that he could obtain his degree—the chief object of his entering the university—nearly a year earlier by pursuing the study of the Civil law, he turned his attention to the reading required in that branch of College studies. Having completed the usual period of residence he passed his public examination, and stood the second in the first class of the law tripos of 1827-8. After the usual exercises, and keeping his public act, he was at the commencement of 1828, admitted to the degree of L.L.B.

Soon after this the curacy of St. Mary Parva in the town of Cambridge, was offered to Mr. Dealtry which he accepted. He was ordained to it as Deacon in the month of May, 1828, by the Lord Bishop of Ely, and Priest in the month of Nov. in the same year by the same prelate.

We have heard him speak in strong terms of the kindness and affection shown him by the Vicar and congregation of St. Mary's during his brief residence amongst them, and his separation from that Church and people caused one of his greatest regrets on leaving his native land.

But the Providence of God had prepared other scenes and fields of labour for him. Consequent upon the alarming illness of our late beloved friend the Rev. T. T. Thomason, and the necessity of the return of the Rev. F. Goode to his native land, the Chaplaincy of the Old Church of Calcutta becoming vacant, was, through the Rev. C. Simeon, offered to his acceptance by Lord Glenelg, then President of the Board of Control. At first it was refused, but being strongly urged upon his acceptance, he gave the subject the most serious and prayerful consi-

deration, and being impressed with the belief that it was the will of God that he should depart from his own country, he no longer opposed. He accepted and was nominated by the Hon'ble Court of Directors to the appointment.

Mr. and Mrs. D. embarked for India on board of the ship John, which left Portsmouth on the 19th of January, 1829, and arrived in Calcutta on the 23rd of June in the same year. He was welcomed by the late lamented Bishop Corrie, and licensed forthwith to the Old Church, to which he had been appointed by the Court of Directors.—And here we must be permitted to express our gratitude to God for the religious influence that has been exercised in connexion with this Church. Who remembers it not by its first name of Beth-Tephillah,—the house of prayer, built by the piety and benevolence of Kiernander, who, whatever might be his failings, had the most enlarged and liberal heart—the most noble and devoted spirit.—India owes more than can be expressed to this Prince of Missionaries. Then, who is ignorant of that Church being seized for debt in consequence of Kiernander being surety for a friend,—of its being put up to public auction, and rescued by the piety of that talented and holy person Charles Grant, the father of the present Lord Glenelg, and through him restored to the service of God. It was also in this Church that David Brown exercised his ministry to the poor for nearly twenty-five years, in addition to his other numerous duties. It was here that the amiable, pious, and beloved Thomason laboured until his strength was gone. Here are associated the names of Henry Martyn, Francis Goode, George Crawford,—men who have left their remembrance written, not in marble, but in the fleshly tablets of the living heart,—in the diffusion of the sacred Scriptures,—in the revival and extension of true and vital godliness. Should any one ask where is their memorial, our answer is "*circumspice*,"—behold it on every hand in the imperishable and indelible record of an increased spirituality and piety which, in comparison with the state of things previous to their advent—or rather we should say in contrast with it, for it hardly admits of comparison, is as the fertile garden to the barren desert. This has God wrought, using his servants as the instruments of his mercy to effect his gracious purposes.

It was in this Church where the subject of our sketch entered upon his labours; and from him this much we can say that the trumpet has given no uncertain sound: there he has laboured in connection with the Rev. Mr. Boyes, who joined him in the year 1831. This latter pious and amiable Chaplain finished his course triumphantly in December, 1841.

After several years of labour in Calcutta, our friend was called to a higher sphere of labour in the Church. On the appointment of the late beloved Corrie to the Bishopric of Madras, the office of Archdeacon of this Diocese became vacant, and was offered to Mr. Dealtry by the present Bishop Wilson. We do not wish to revive a controversy which created considerable discussion at the time as to the propriety of passing over a system of seniority in such appointments more consonant it was said, with the spirit of the Indian services, but this we may state that it was not of the Archdeacon's seeking in the most distant manner, and that nothing could be more disinterested in the mind of the Bishop than in calling him to the appointment. We may add further, and we appeal to every Chaplain in India as to our accuracy, in saying

that no one could have performed the duties of his station with more diligence, integrity and impartiality than the Archdeacon has done. He was appointed to the office of Archdeacon, September 1st, 1835.

He has continued to labour as the Pastor of the Old Church, notwithstanding this appointment, and we know is much attached to the congregation. It is his intention, we are satisfied, to spend and be spent in God's service in connection with it.

As a Preacher he is entirely practical, seeking to set forth Christ and him crucified. Bold and decisive, with a thundering eloquence, he speaks at once to the consciences of men. His appeals are often deeply affecting, as the earnestness with which he paints the awful state of lost souls shows his sincerity and desire to be the favored instrument of rescuing them from the horrors of the wrath to come; indeed we have seldom heard a Preacher who so successfully lays before his hearers the terrors of the law to the wilfully impenitent.

But then, again, he is equally successful in marking the love, the marvellous love of Christ to sinful man, in depicting the sufferings, the agony, and death on the cross for him and for his salvation. Again, the subject of our sketch entreats, exhorts and persuades in language of deep feeling, and effectually shows that Christ willeth not the death of a sinner but that all should be saved by Him.—We are convinced that no minister has ever come to India who has delivered his message with more faithfulness—has warned the worldly and reveller of the fearful consequence of men dying in their iniquities, with more earnestness, or who has been nevertheless so successful in securing crowded congregations, and imparting, through the Redeemer, new and holy life among them, as this favored instrument, and we hold him up in the pulpit as a minister of Christ worthy of universal imitation.

Although the Archdeacon has a written sermon before him, he delivers the greater part extempore and with an eloquence and power we have seldom heard surpassed. He is always solemn in his demeanour,—in action altogether suited to his delivery, and in language perspicuous and striking.

From this description our readers may at once conceive what are his doctrinal views;—they are strictly and entirely evangelical; he exalts the doctrines of salvation by grace through faith, so as to satisfy the most confirmed Calvinist, and insists no less strongly on the freedom of human actions and man's responsibility so as to conciliate the most zealous Arminian: he does not attempt to reconcile these opinions nor is he at all polemical in his statements. He is most decided in his views against the present theological movement of the Oxford school, and thinks they are calculated to bring in a formal and theoretical religion,—to make men think they are Christians simply because they are Churchmen. What he says of his late friend and Colleague, the Rev. R. B. Boyes, in the funeral sermon preached on the occasion of his death, is strictly true of himself.

He is afraid that the prevalence of these opinions is a judgment on our Church and nation for our sins of unfaithfulness, and that it will be permitted to go on until it brings on some fearful catastrophe in the Church, unless the piety of the right minded prevent it.

The foregoing exhibits the character of the subject of our sketch as a Churchman; but while he is firmly attached to the Church of England,

both to her Episcopal Government and her beautiful services, he has no sympathy with those Divines who would exclude all those from the certain hope of salvation who agree not with their views. From our intimate acquaintance with him we have learned that he is a lover of all good men, of whatever persuasion they may be.

As a private Christian he lives as he preaches,—embodying in his life the precepts he inculcates, and taking Christ's example for the model of his walk, as well as his atonement as the ground of his faith and hope. His is the charity that is not in word only, but in truth ;—then as a Pastor he is assiduous in his visits, especially to the sick, and is remarkable for his care and love of the young of his flock.

He is the author of a great number of separate sermons. We regret our space will not admit of quotations from them. He has also published some tracts. One, "a critical examination of our Lord's discourses, with regard to the evidence they afford of his Divine mission," has been eminently useful in confirming the minds of Christians in that leading article of faith. He has been solicited by many in his congregation to publish a volume of Sermons, but his arduous duties have hither precluded his complying with their wishes.

From the first day of his arrival in the country he has never ceased to take a lively interest in all those Societies which have in view the promotion of Christian truth :—The Bible Society—The District Charitable Society—The Church Missionary Society—The Temperance Society—Public Schools, &c., in all of which he has taken a leading and prominent part.

Christ Church, Cornwallis Square, was raised through his instrumentality in connexion with the Old Church, and the first native preacher placed over a regular native congregation was Khrishna Mohun Banerjea whose sketch has already been given. There has scarcely been any thing which has tended more to promote and spread Christian truth in this country, than the raising up of such a temple of God, especially as being native in all its character. The Church is solely supported by the congregation of the Old Church, and the schools are on the foundation of the venerable Society for Promoting Christian Knowledge.

Such are the services, and such the eminent character of the subject of our sketch. As it may be supposed, after fourteen years hard labor, his health, we regret to say, has failed ; he had an attack of fever about two years ago, from which, at one time, he was not expected to recover ; his health since that period has been greatly impaired ; on this account his medical advisers have insisted upon his return to Europe in October next, and he will D. V. remain there two years. There can be no question that the seed he has been the favored instrument of sowing will not return void to the gracious and beloved Redeemer, who commissioned him to preach good tidings to poor sinful man. His large and intelligent congregation will never cease to feel grateful and anxious for his restoration to health, for the happiness, for the prosperity and for the return of their beloved Pastor, who has built them up as a living Church to Christ. They have indeed heard from his lips their increased responsibility to God, and of the necessity of seeking to possess that godliness which is profitable unto all things, having the promise of the life that now is, and of that which is to come.

HISTORICAL RESEARCHES.

By Lieut.-Col. W. R. Pogson.

(*Continued from page* 78.)

In support of the opinions already intimated in the course of these Researches, that Noah and his family had sojourned in the vicinity of Caubool, the following interesting passages may be quoted. The first occurs in the memoirs of Sooltan Babur, who thus mentions Nungnihar in the year A. D. 1504:—

"Nungnihar," he says, "in many histories is written Nekerhar. The residence of the darogha, or commandant of this district is Adinapoor: Nungnihar lies to the east of Cabul, thirteen farsangs of very difficult road. In three or four places there are some very short kotuls, or steep hill passes, and in two or three places, there are narrows or straits; the Khiralchi, and other robber Afghans tribes, infest this road with their depredations. There was no population along this road until I settled Kuratur below the Kurruksai, which rendered the road safe. The Gurmsil (or region of warm temperature,) is divided from the Sersil (or region of cold temperature,) only by the steep pass of Badam Chesmeh. Snow falls on the Cabul side of this pass, but not on the Kurruksai and Lumghanat side; the moment you descend this hill pass, you see quite another world. Its timber is different, its grains are of another sort, its animals of a different species, and the manners and customs of the inhabitants are of a different kind. Nungnihar has nine streams. Its rice and wheat are excellent; oranges, citrons and pomegranates are very abundant, and of good quality. Opposite to the fort of Adinapoor to the south, on a rising ground, I formed a Char Bagh, (a great garden,) in the year 914, (A. D. 1508.) It is called Bagh Vafâ, (the garden of fidelity); it overlooks the river, which flows between the fort and the palace. In the year in which I defeated Behar Khan, and conquered Lahore and Dibalpoor, I brought plaintains and planted them there, they grew and thrived! The year before I had also planted the sugar cane in it, which throve remarkably well. It is on an elevated site, enjoys running water, and the climate in the winter season is temperate; the garden is charmingly laid out: to the south lies Soofaid Koh, which seperates Bungush from Nungnihar. Nine streams descend from the mountain; the snow on its summit never diminishes. On the skirts of the hill there are many airy and beautiful situations. On the south of the fort is Adinapoor. The tomb of holy Lâm, the father of Nuh, is in the Tooman of Alishung. In some histories, the holy Lâm is denominated Lamek and Lamekan. The people of the country have a general practice of changing the letter Kaf into Ghain, and it seems very probable that the name Lamghan originated in that circumstance*."

This Lamekan, Lamghan or Lughman derives an additional interest from having been the place in which the British Captives were confined by Moohumud Akbur Khan.

* India Review No. LXXV. page 268.

Lieut. Eyre, in his interesting Narrative of the disastrous retreat from Caubool states :—

"We also passed within a mile of a plain white building on our left, which was pointed out as the tomb of Lamech, the father of Noah, and a favourite place of pilgrimage with the Affghans." [page 251]

The dispersion of the sons and posterity of Noah,—the regions in which they settled, and whence their descendants spread over the earth, are plainly described in the scriptures.

All accurate historians concur in the sacred writings being unequalled in regard to age and authority, and in having supplied all the testimony and records of antiquity which have come to the knowledge of mankind concerning the origin of nations. The sons of Japhet were Gomer, Magog, Madai, Javan, Tubal, Meshach and Tiras. The sons of Gomer were Askenaz, Rephath, and Togorma : and the sons of Javan were Elisha, Tarshish, Kittim and Dodanim.

The Isles of the Gentiles were divided among the posterity of Japhet at the time Nimrod went to Shenaar, and assuming the division to have been at the birth of Phaleg, in the year of the world 1757, it was 130 years after the flood. The Isles of the Gentiles formed the lot of Japhet, and comprised Europe and its islands. Europe was itself considered an island on account of its peninsular form, and the known world having, in Oriental ancient geography, been divided into Dweepas, or islands, or more correctly, continents, which is, however, rendered by Muhadwip and an island by Upadwip*.

Independent of Europe, the portion of Japhet extended over some of the northern and other regions of Asia, realizing the blessing of God pronounced by Noah†, Dilatet Deus Japhet. Let God spread forth, or increase the posterity of Japhet, and let him dwell in the Tents or Tabernacles of Shem. Instead of dilatet, Junius uses the word alliciat, the Geneva version, persuadeat, and the Septuagint dilatet or amplificet‡.

Such was the blessing given to our fathers and promised to Abraham and his seed for ever : the fulfilment of this blessing is strikingly verified in the present day; for southern Asia, which formed the inheritance of Shem, is in the possession of the descendants of Japhet, or in other words, the British, who are consequently dwelling in the Tabernacles or country of Shem, exemplifying the fulfilment of prophecy after a lapse of more than four thousand years.

Berosus, Annius and Functius assert that 140 years after the deluge in the tenth year of Nimrod, Gomer quitted Babylonia, and planted a colony in Italy, and that two years later, Tubal settled in Austuria, now called Biscay, in Spain. It was consequently ten years after the Isles of the Gentiles were divided, which is assumed to have been 130 years after the flood. We read in Genesis xi, that the whole earth was of one language, and that as Nimrod and his followers "journied from the east, they found a plain in the land of Shinar and they dwelt there ; and they said, let us build us a city whose top may reach unto heaven, and let us make us a name, lest we be scattered abroad upon the face of the whole earth. And the Lord said, Let us go down and there confound their language that they may not under-

* Col. Welford, Asiatic Researches. † Gen. ix. 25, 27. ‡ Sir W. Raleigh.

stand one anothers speech. So the Lord scattered them abroad from thence, upon the face of all the earth, and they left off to build the city."

The profane writers above cited, say, the tower was ad altitudinem et magnitudinem montium—to the height and magnitude of mountains; a hyperbolical mode of conveying an idea of its great height; it is therefore improbable that it could have been built in ten or twelve years after the Isles were divided,—which could not have been until the dispersion of mankind, and therefore Gomer and Tubal could not have gone to Italy and Spain so early as 130 years after the flood, when the earth must have been covered with Lakes, marshes, thickets, forests, grass and vegetation, rendering it impervious to emigration. The construction of the ark proves that ship building must have been well understood, and that astronomy and navigation were imparted by Noah to his posterity.

Maurice thinks that the antidiluvians were acquainted with naval architecture, of which there can be no doubt, since it is hardly reasonable to suppose every plank of the ark to have been fitted by inspiration. Although the loadstone is said to be a modern invention, we have the authority of Dr. Hyde* for affirming that the Chaldeans and Arabians had immemoriably used it, to guide them through the deserts of their respective countries; and, according to the Chinese records, the Emperor Ching Vang, above 1000 years before Christ, presented the Ambassadors of the king of Cochin China with a species of magnetic Index, which, says Martinius, certe monstrabat iter sive terra illud, sive mare facientibus. The Chinese, he adds, call this instrument Chinan, a name by which they at this day denominate the mariners compass. There can therefore be no doubt that the people of Asia have been long acquainted with its use, and that the Chinese, the learned of Hindoostan, the Phenicians, and the mariners in general, were in the most remote periods engaged in projects of commerce and distant navigation: for in the most venerable of their sacred Law tracts, the Institutes of Menu, that is the first or Swayambhuva Menu, supposed to have been revealed by that primeval legislator, many millions of years ago, and to which Sir William Jones could not assign a less ancient date than a thousand or fifteen hundred years before Chirst—and is probably of far greater traditional antiquity; he mentions a curious passage in it on the interest of money and the limited rate of it, with an exception in regard to adventurers by sea†." Maurice continues‡, "we shall hereafter be able, by additional arguments, to prove the magnet to have been of very ancient use, and the knowledge of it was probably the gift of Noah to his descendants who settled on the coast of Phenicia, for without that gift it must have been impossible for them to have explored, as tradition and history prove they did, the most distant quarters of the globe. There was therefore nothing impossible in Gomer and Tubal having gone to Spain and Italy by sea, excepting that the scanty population, 130 years after the flood, rendered it improbable.

The dispersion of mankind must, therefore, have been gradual, for it was not until after the confusion of language, when the followers

* Hyde de Religione veterum Persarum p. 189.
† Asiatic Researches, and Maurice.
‡ Maurice page 436-7 and Asiatic Press.

of Nimrod had become a mighty people, that they diverged into the adjoining regions of Mesopotamia, Babylonia and Chaldea.

The countries east and west of Shinar which were allotted to Shem long remained in the possession of Nimrod before and after he entered Syria and founded Niniveh.

Abraham, the descendant of Shem, remained at Ur, in Chaldea, until called by God to go to Charran, in Mesopotamia, whence, after the death of Terah, he went to Sechem in Palestine. Between Shem and Abraham seven generations had passed without reckoning either of them. It thence appears that the blessing of God given by Noah to Shem and Japhet, did not take effect for many years, and that the first great rulers of nations were of the posterity of Ham.

The sons of Ham were Cush, Mizraim, Phut and Canaan. Cush* gave his name to Mount Libanus, thence called Cushica or Caucasus, and to this day, the Hindoo Cush. From these mountains, as far as Egypt, constituted, as has been stated, the interior Cusha dwip. In the Septuagint and other versions of the Bible, both Cusha dwip within, and Cusha dwip without, are alike rendered by the word Ethiopia, which has consequently involved different texts in obscurity, and rendered them at variance with the plain and clear explanations of Moses.

The parts of the Scriptures in which this error has been observed, are Gen. xi. 13. Numb. xii. 1. Exod. ii. 15. Ezek. xxix. 10. xxx. 9. Isai. xviii. 1. 2 Kings xix. 18 to 35. 2 Chron. xiv. 9. Gen. x. 11, 19. Gen. xxvi. 1. Jer. ii. 18. 2 Chron. xxi. 16.

The original translation of the Hebrew Scriptures was the Septuagint or Greek version. The Septuagint has been found to contain passages erroneously translated, so that the obvious sense and meaning have been lost.

The Vulgate is admitted to be a most accurate Latin translation of the Septuagint, with the consequent adoption of its errors.

All other versions of the Old Testament were from the Vulgate, or from languages into which they were directly or indirectly rendered from the Vulgate, and consequently perpetuating the errors which the Vulgate received from the Septuagint.

The present version, commonly called King James's Bible, was commanded by that Sovereign in order to correct the imperfections of the preceding translations. We read, that "fifty-four persons, distinguished for their piety and profound learning in the original languages of the sacred writings, were appointed to this important labour."

Of that number, however, only 47 assembled for the purpose. The king commanded that "when any place of special obscurity is doubted of, letters" (were) "to be directed by authority to send to any learned in the land for his judgment in such a place." "Letters to be sent from every Bishop to his clergy, admonishing them of this translation in hand, and to move and charge as many as being skilful in the tongues, have taken pains in that kind, to send their particular observations to the company either at Westminister, Cambridge or Oxford," &c.

"These translations to be used when they agree better with the text than the Bishop's Bible, viz., Tindal's, Coverdale's, Mathew's, White's, Church's, Geneva."

* Gen. ix. 6. Asiatic Researches, Vol. III.

"Three or four of the most ancient and grave Divines in either of the Universities, not employed in translating, to be assigned by the Vice Chancellor, upon conference with the rest of the heads, to be overseers of the translation, as well Hebrew as Greek," &c.*

The proficiency of these learned Divines in Hebrew, and of all who have professed a knowledge of that language since the days of Jerome, may be estimated and appreciated by their having left the most prominent errors in the Septuagint translation uncorrected, as will appear from the following illustrations.

"And† the Lord planted a Garden eastward in Eden," &c., "and a river went out of Eden to water the Garden, and from thence it was parted and became into four heads.

The name of the first is Pison: that is it which compasseth the whole land of Havilah," &c., "and the name of the second river is Jihon, the same is that which compasseth the whole land of Ethiopia: the name of the third river is Hiddekel, that is it which goeth towards the east of Assyria; and the fourth river is Euphrates."

The sense of this passage is perverted by the Septuagint having translated the word 'Cush'—Ethiopia,—thereby originating the absurd opinions of early Historians regarding the locality of Eden; some of them placing it beyond our known world, others above the middle region of the air; some, near the moon; others, as far south as the line or as far north as the pole.

The text informs us that this "Garden was eastward," from the place where this was written by Moses after he had crossed the Red Sea. The prophets also define its locality‡, and our researches from sacred and profane History, seem accurately to fix the site of Eden.

It was in the valley of Shenir that Cush§, the son of Ham, first settled with his sons Sheba, Havila, Sabta, Raamah, Nimrod, &c.

The land watered by the Jihon first received the name of Cush.

The region through which the Pison flows was, after the son of Cush, named Havilah.

This land of Havilah was therefore originally also called Chusea, then Chusa, Susa and Susiana.

After the building of Babel in the valley of Shenar, it received the name Babylonia; and Comester informs us that Chaldea, Babylonia et Senir idem sunt and Niger, Assyria te Babylonia in Mesopotamia, nomen transierunt, Assyria and Babylonia took the name of Mesopotamia. Assyria was called Iturœa by the Chaldeans.

The Scriptures, reason and experience, convince us that the Pison could not have been the Ganges, nor the Jihon the Nile, as early writers have imagined.

The Ganges flowed through a country also anciently named Havilah, from Havilah, the son of Joktan. Joktan, the descendant of Shem, had thirteen sons who dwelled in the east part of the world, or India. The land of their abode is not defined: the words of Moses being general. "And their dwelling was from Mesha, as thou goest unto Sephar, a mountain of the east‖.

* Home's Introduction to the Critical Study of the Scriptures, Part 1, Chap. 1, Section vi. § 3

† Gen. ii. 8 to 14.

‡ Isai xxxvii, 12,—Ezek. xxvii. 23,—vide India Review, No lxv. Vol. vii p, 281, for May, 1841

§ Gen. x. 6 to 11.

‖ Gen. x 29 30

The error of imagining the Pison to be the Ganges was first committed by Josephus, whose fields, though fertile, are full of weeds.

Other writers, adopting him as their authority, without examination, received his information as adequate proof: hence Epithanius, Augustine, and Jerome, in endeavouring to discover Havilah, removed the Pison to India:—as the Jihon was to Africa, from being described as flowing through Chus, which is erroneously translated, Ethiopia: and hence the Nile has been misnamed the Jihon.

Steuchius says, nulla super est dubitatio, quin Ethiopia in sacris literis sit Arabiæ propinqua. There in no doubt that Ethiopia in the Scriptures is taken for the country which joins Arabia*.

The text states that "a river went out of Eden to water the Garden and from thence it was parted and became into four heads.

This may be expounded as four notable passages into famous countries, flowing from one great river and following its course not all the way down the stream, (which is not in the text) to the countries mentioned, but naturally branching from different parts.

The Pison which enriches Havilah, after its junction with the Tigris, receives the name of Pisitigris or Piso Tigris, from the union of the names Pison and Tigris.

The Pison was also called Nuhiri Malika, which is translated Basileus and flumen regium†. It unites with the Tigris at Apamia, whence originates the appellation of Pisi Tigris, and flows through the land of Havilah or Susiana. The second branch is the Jihon. It is also called Nuhr rages, signifying flumen derivatum, a divided river: also Acracanus, quasi Ranosus, on account of the numerous frogs generated in its fens. It flows to the first abode of Chus on the borders of Arabia and Chaldea, and loses itself in the lakes Chaldea.

The Heddekel or third branch may be expounded as the upper stream of the Pison or Basileus, which runs into the Heddekel above Seleucia, whence, proceeding up the river, conducts to Assyria, retaining the scriptural name of Heddikel throughout its course.

The Septuagint and all other writers agree in the Heddekel being the Tigris. Heddekel Tigrim omnes exponunt‡. All writers expound the Heddekel to be the Tigris. Moses moreover explains that the 'Heddekel goeth eastward toward Assur, and the Tigris was the chief river of Assyria, whose capital was Niniveh; for in Gen. x. 11, it is written that out of that land, namely Babalonia, Nimrod went to Assur and builded Niniveh.

The word Tigris, as well as Teer (the Arrow), are appellations to denote the velocity of the stream. It has also been named Armodius, Dujulto, Dijlath, Sylax, and is now commonly called Dujluh.

The fourth branch is called Perath, which the Greeks changed into Euphrates. It is to this day commonly called the Forat. The name of the Euphrates is lost by its flowing in the channel of the Jihon to the lakes of Chaldea, which the united streams enter not far from Ur, whence Abraham came to Haran in Mesopotamia: consequently the Euphrates does not flow entirely into the Persian Gulph. Both the Tigris and the Euphrates flow from the mountains of Armenia, and enclosed the region of Padan Aram, or Jugum Syriæ; so named because the Tigris and Euphrates enclosed it as in a yoke, and Aram

* Raleigh. † Ptolemy. ‡ Vatablus.

Nuhurraim or Syria duorum fluviorum or Mesopotamia, or inter Amnis —better known in India by the term Doab, or the country enclosed by two rivers. The Euphrates is called by Pliny, Perixates; by Junius Pukperah, signifying pouring forth. Where it descends from Mount Taurus it is called Omyra. By Plutarch, Medus; by the Hebrew, Perath; by Pagninus, Parath; by Josephus, Phorah; by Eusebius, Zozimus; by Amianus and others, Cobar; by Ezekiel, Chebar; which is rather a branch of the river, and by the Assyrians, Armalchar, or Nuhr i Amalchor. The Tigris and the Euphrates being mentioned in the text as two of the rivers, there can be no doubt that Eden must have been near them. Herodotus mentions the isle of Eden as about twelve miles from Nineveh and the same from the modern Mousul: the ancient city which Ptolemy and Tacitus call Ninus—the scriptures Nineveh: Philostratus and Simeon Lethi, Mosula, John Lean, Mosal, and others, Mosse, though the latter is situated a little above Mosul: consequently the site of Eden must have been in this vicinity; for Andrœus Masias places it above Mosul and below Husn Cepha on the Tigris.

It may, however, be asserted that the Epistles of the Nestorian Christians in No. lxv. volume vii., of the India Review, page 281—do not mention an Island in the Tigris called the isle of Eden; but an isle in the Tigris, a river of Eden: the texts also informs us that the Euphrates and the Tigris were rivers of Eden. And we have the testimony of the learned in those parts that the name of Eden was not quite obsolete and forgotten, though the region which once bore that name has been subject to the same changes as all other countries from conquest and the corruption of languages, in causing new and differing names,—for the south part of Eden, was after the flood called Shinar—and then Babylonia, &c.—and the northern part of Eden included those parts of Mesopotamia, Assyria and Armenia which lie on both banks of the Tigris between Mount Taurus and Seleucia.

Mention of this region of Eden is also made by the first Æthicus, who lived long anterior to the second Æthicus, the cotemporary of Philadelphus.

This account of Eden by Æthicus, is translated by St. Jerome from the Greek into Latin: and though, from a corruption of the ancient copy, Adonis, is written in Æthicus, for Edenis; yet, Adonis being a river of Phenicia, cannot be understood as the region named by Æthicus, who makes it a country and not a river—and joins it to Mesopotamia and Chus, naming the latter Ethiopia in accordance with the Vulgate and Septuagint erroneous translation.

Strabo describes Armenia as possessing a perpetual spring, and it is supposed by many to have been the site of Paradise.

Horodotus says Ex Euphrate exiens in Tigrim, alterum flumen, juxta quod Urbs Ninus sita erat, hœc regio, omnium quas nos vidimus optima est. Where the Euphrates flows into the Tigris, near the site of the city Ninus, the region is the most excellent of all we have seen. He afterwards adds,—Cereris autem fruetio procreando adeo ferax est, ut nunquam non fere ducenta reddat, &c. It is so fruitful in corn that it yields 200 fold: the ears of wheat and barley are almost four fingers broad. The millet and sesam are as tall as trees, and although I know this to be true I refrain from dwelling on it, because it would appear incredible to those who had never been in the country of Babylon.

There palm trees grow spontaneous, and most of them bear fruit, from which is prepared food, wine and honey, &c.*

Strabo and Niger ascribe a fourth excellency to the palm tree,—ex quibus panem, et melet vinum, et acetum conficiunt, from which the people make bread, wine, honey and vinegar, and Antonius observes that the palm tree produces the finest flax, of which they make clothes, and ropes for ships. Quintus Curtius says—Euntibus a parte læva Arabiæ odorum fertilitate nobilis, regio campestris interest inter Tigrim et Euphratem, jacens tam ubere et pingui solo, ut a pastu repelli pecora dicantur, ne satietas perimat. Going on the left of Arabia, celebrated for its fragrance, there is an open country situated between the Euphrates and the Tigris, of so rich and fertile a soil that the people are said to drive their cattle from pasture lest they should die from repletion. Bis in anno segetes Babylonii secant. Niger says, the Babylonians cut their corn twice a year; and Strabo relates of the south of Armenia which borders on the north of the region of Eden—Tota enim hæcet regio frugibus et arboribus abundat mansuetis, itemque semper virentibus,—This region abounds in delicious fruits and ever verdant trees. Pliny says of it, Ubertatis tantœ sunt ut sequenti anno sponte restibilis fiat seges—such is the fertility, that the following year the crop is of spontaneous growth.

Suphanus de urbilus mentions the city of Adana on the Euphrates. The name of Eden was in use in the time of Amos, referring, however, to another region of that name in Coelesyria, where the Jews supposed Paradise to be situated. Cœlesyria is situated between Libanus and Antelibanus, so called from the Greek Coile, hollow, and the Hebrew Syria, a valley.

(To be Continued.)

THE COMET.

March, 1843.

The splendid comet which has been the delight of astronomers and the admiration of the public for the last month is at the time we are writing (April 4th), about to be lost to them, both from the superior lustre of the moon and its own increasing faintness. It has for the last ten days been unsusceptible of lamp illumination in the field of a telescope of twenty-one tenths of inches in diameter, attached to one of Troughton's altitude and Azimuth circles in our possession. The proper instrument for observing it at this time is a telescope of large aperture, say $2\frac{3}{4}$ or $3\frac{3}{4}$ inches, fitted up with an eyepiece of very low magnifying power. Our own gives a power of 14 to a focal length of 44 inches. The telescope should be mounted equatorially, on Smeaton's block for instance. The eyepiece should be furnished with the annular micrometer. But as we cannot suppose every one desirous of observing a comet to be in possession of instruments which are seldom to be found except in observatories, we shall point out how any zealous amateur may, with very small means, render good service to astronomy

* Herodotus.

on such an occasion. The first substitution is that of an ordinary night glass of 3 or 4 inches aperture, and from 2 to 3 feet focal length, which costs in London 3 or 4 guineas, and, if new, half as much more in Calcutta. This kind of glass is much used by seamen for discerning faint or dark objects on account of its large supply of light. It generally magnifies 6 or 7 times, which is enough for cometary observation. The next thing to be considered is the mounting which ought to be equatorial, that is, the axis, on which the telescope is supported should represent the polar axis, instead of the vertical or plumb line, as it does in ordinary pillar and claw stands. This may be effected by separating the pillar from the claws, and attaching it perpendicularly to an equatorial plane. Our imitation of Smeaton's equatorial block was made by a common mistry, of course from a specification. It stands on three legs like a theodolite tripod, but firmly braced together, instead of folding. The upper extremities are inserted in a cylinder, whose altitude may be about three inches, and diameter of base about six, of this cylinder an oblique section must be made by a plane representing the equator, and therefore inclined to the lower plane surface of the cylinder, supposed horizontal, an angle equal to the colatitude of the place where the instrument is to be used. The plane should touch the circumference of the inferior base. This will be a sufficient indication of the construction to scientific men, but as we write for the public we shall give an easy rule. Draw through the centre of the upper surface of the cylinder a straight line, and divide it into two parts (they will be unequal) of which one is a fourth proportional to the following quantites in the order named, 1st, cotangent of the latitude of the place to radius, the diameter of the cylinder's base: this must be taken from a table of natural tangents, &c. :—2nd, the diameter of the cylinders base, which persons will choose for themselves :—3rd, the difference of the aforesaid cotangent, and the height or distance between the two plane surfaces of the cylinder, which height is also optional, so long as it be not greater then the aforesaid cotangent. Having thus determined the point of division, draw through on the surface of the cylinder a perpendicular to the diameter already drawn, and on the other surface of the cylinder draw a diameter parallel to the first, which may be done by an ordinary carpenters square. Now make a section of the cylinder through the line perpendicular to the diameter, and the point in which the diameter of the inferior base intersects its circumference, and the cylinder will be ready for mounting on the tripod. A chisel will do the rough, and a file the finishing part of this operation. The original plane surface of the cylinder may now represent the horizon and the oblique section the equator. We give a figure, to assist the conceptions of our readers.—*Fig.* 1. [*See conclusion of Article.*]

Suppose ABCD the cylinder, AB the intended upper plane surface, AB its diameter, E the point of division of AB, GF perpendicular to AB through E, DC the diameter of inferior plane, GEFC the oblique section, H the bisection of EC. The pillar axis before spoken of should now be superposed on H, so as to be perpendicular to the oblique plane and the instrument is fit for use when AB is placed as nearly in the meridian, and its plane as nearly level as possible. It is the point A which is to face the south.

A telescope thus mounted is moveable in right ascension by turning

it right or left, and in declination by moving it up and down, and it will follow a heavenly body with the former motion only, which is its great advantage over a telescope moving in altitude and azimuth.

We have now to consider the furniture of the eyepiece. Two substitutes for a perfect micrometer may be recommended as being within the reach of the ingenious amateur. The first is called a *reticle* and is constructed in the following manner :—

On a circular piece of stiff paper or thin copper, whose size must depend on that of the eyepiece, draw a square RSTV, whose side must not be greater than the diameter of the perforation of the stop, and whose centre is the centre of the circle, and having bisected the sides in the points A, Z, E, X, draw the straight lines AV, AE, AT, ES, ER, ZX, the intersections being denoted by D. C, B. The line AE is not essential, but is frequently inserted. We recommend its omission. The figure is then to be cut out with a sharp knife or file, and centrically inserted in the focus of the eyepiece of a telescope, which is to be turned round till a star moves along DB without leaving it. The star chosen should be as near the place of the comet as possible, and if in the field at the same time with the comet, the better. The observer is then to note the times of transit of the comet across the lines AD and AB, or across the lines DE and BE if it be in that part of the field ; not forgetting to remark in which of these it is, their middle time is the time of transit across AE whether existing or suppressed.

Let the same be done with a known or easily identifiable star, as soon afterwards as possible, noting whether the star passed above or below DB. The observation is now theoretically complete, but for practical exactness should be repeated as often as possible. A common watch will keep time accurately enough during the short time employed in the observation. It will be seen that the only quantities required are the interval between the transits of the comet over the wires, the interval of the transits of the star over the wires and the interval between the two means above mentioned. A comparison of the first two gives the difference of declination of the stars and comet, and the last gives the difference of their right ascensions. The other parts of these wires may be used or not at the discretion of the observer. Any astronomer to whom the amateur may communicate them will be at the labour of reducing them. He should receive the time of an equatorial star passing from D to B, and a description of the instrument used would be advisable, together with the time and place of observation. This micrometer, which should be used with a positive eyepiece, gives good results in declination. Lalande, Delambre, or Pearson may be consulted with advantage. A known star is always to be preferred, when obtainable, in the use of this and the following instrument :—

A substitute for the circular micrometer may easily be made by twisting two pieces of wire round a true cylinder, with care to keep the curve in one plane. Fig. 8. the ends A and B may be fastened with sealing wax to the stop of a negative eyepiece, whose perforation is represented by the exterior circle. The observation is more simple. Note the interval between the times of the transits of the comet at C and C, and waiting for a known, or easily identifiable star, note the like interval at S and s. These with the value of

the diameter in time from an equatorial star, will be sufficient, to determine the difference of declination of the star and comet, if the observer states whether the passages were above or below the centre. The difference of right ascension is obtained as before. The observations, for the sake of greater accuracy, should be often repeated on the same nights, and on as many nights as possible. For Olbers' method of determining the orbit from three observations at equal intervals, Library of Useful Knowledge, treatise on astronomy, may be consulted. For other methods, Delambre. We regret that the space to which we limit ourselves in this number does not admit of further detail. We may probably resume the subject in our next, and now close with expressing how much pleasure we shall have in receiving the observations made with the above described or other micrometrical means. We are confident that the expence of such apparatus as we have is not above 65 Rupees, and *may* be as low as 25, if bought second hand, at which trivial cost an observer will be as well provided as Messier or Olbers.

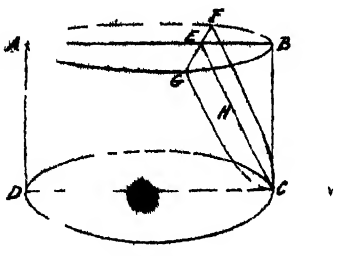

Fig 1

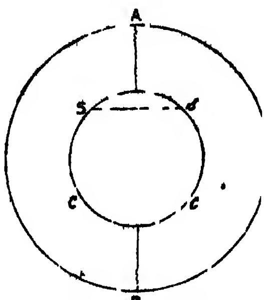

Fig 3

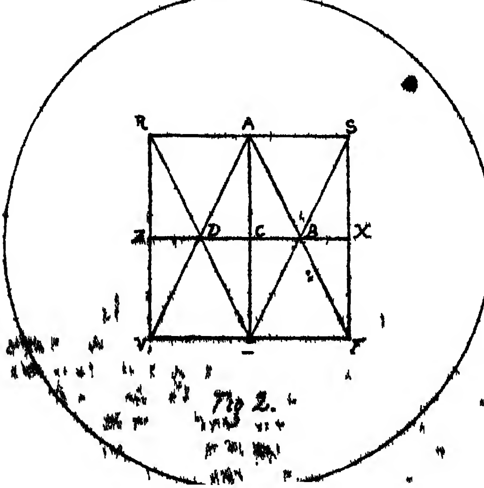

Fig 2.

PULPIT SKETCHES.

Taken in Calcutta.

No. II.

Mr. Editor,

Among the evidences of the authenticity and divine origin of the Christian religion, there is one which has frequently produced a powerful influence upon my own mind. I refer to the corroborating testimony which is involuntarily borne by the human heart to the truths of the doctrines, the evangelical doctrines, preached from the holy Bible. How often has the proclamation of these doctrines, in the simplest, I might almost say the rudest manner, exerted a more efficacious sway over my mind, than the most logical and laboured effort to establish a preliminary conviction of the abstract truth of the Christian Religion. Let me explain.—I have listened to the man of learning and eloquence. I have heard him take a text which seemed to be selected for the purpose of displaying his ingenuity and powers of argument. I have listened with rapt attention to his easy and graceful exordium, skilfully adapted to prepare the way for the statement of certain propositions. I have marked with admiration the masterly reasoning by which he sought to deduce a particular doctrine from his text. I have been charmed, and transiently affected, by the flowing and pathetic peroration; and, on the dismissal of the crowded and fashionable congregation, I have united in ascribing to the preacher the highest praise, as an orator, a scholar and a divine. It was as one who played well upon an instrument, and I longed to hear him again, that my pleasurable sensations might be renewed; that I might listen, and wonder at the copiousness of my own language, and the opportunity which the sublime realities of the Christian religion afford to the man of education and learning and poetry, to exhibit to the greatest advantage his high gifts and extensive acquirements.

Often have I been the guest at the house of some dear friend, in a rural and sequestered village in England, where there was no sound to break the stillness of the sabbath morning—

> "But the sound of the Church-going bell,"

swinging in the ivy mantled turret of the adjacent venerable edifice, half hidden by the patriarch trees of the hamlet. Thither have I gone, wandering in my way though the grave yard, and

> "O'er the long flat stones,
> With nettles skirted, and with moss o'er grown,
> That tell in homely phrase who lie below."

The humble curate has been the preacher. His congregation, a few families of wealth and local importance, a few town bred strangers, come down to enjoy the shooting season, the farmers of the neighbourhood, the humble tradesmen of the village, their thrifty and healthy-looking housewives, their happy families, and the rustics of the parish in their snow white smock-frocks, with their wives in their best ribbons, and

the "toddling wee things" by their side. I have said the humble curate was the preacher. Before I entered the Church, my host has said, "you must expect nothing fine from the pulpit. Our curate is a plain man. He preaches only Gospel sermons, and he remembers to whom he preaches ; that they are the poor and the illiterate ; or, if he has a few auditors of higher station and more refined tastes, he considers that there is no royal road to heaven, and that the penalties of transgression, and the way to reconciliation, should be proclaimed to all alike."

From the old oaken desk, with its time-worn cushion, I have heard the text,—"The way of transgressors is hard," or "Believe on the Lord Jesus Christ and thou shalt be saved," or "Ye must be born again," or "As I live saith the Lord, I have no pleasure in the death of the wicked," or "Turn ye, turn ye, from your evil way, for why will ye die?" Some of your readers, I doubt not, have felt with me the effect often produced by the solemn utterance of a simple text of scripture. It did not startle by its novelty It awakened no curiosity respecting the character of the sermon. It did not produce an itching ear. It sunk into the heart. Why?—It was the word of God. The word of God to man—to fallen, guilty, helpless man—to man absorbed by trifles, yet thirsting for immortality ; proud, yet conscious of criminality ; gay, perhaps, but not happy ; sceptical it may be, and disposed to find a flaw in an argument, yet, with something in his breast that said, it is the Voice of God that speaketh, and it saith unto me, "Thou art the man."

The preacher having announced his text, proceeded to deliver his message. He spoke of the fall of man, his estrangement from God, his exposure to wrath, of Divine love, of a plan of redemption, of pardon ;—

> A pardon bought with blood, with blood Divine,
> With blood Divine of him we made our foe,
> Persisted to provoke, though wooed and awed,
> Blest and chastised, bold flagrant rebels still.
> Nor we alone, a rebel universe,
> Our species up in arms, not one exempt,
> Yet, for the foulest of the foul—He died"

Did I think of grammar, or style, or composition, or pronunciation, or method, or arrangement, during the sermon? No.—The preacher was speaking to me of the things belonging to my peace. My peace of conscience, my peace with God, my escape from misery and ruin, my eternal rest in heaven. Oh! how I have longed to seek the messenger of truth, and pour out my soul in his presence, that he might direct me in the way which leadeth from conviction of sin, to that happiness which those enjoy, who step into the liberty of the sons of God!

Sir, the well-remembered spots in my native land, where I have heard sermons like these, and experienced feelings like these, are sacred. They will not be forgotten, no, I believe not even when the Earth and all things therein shall be burnt up. Oh! how I love such a preacher as I have described! A man who gives God the honour, by delivering His message with all faithfulness and simplicity. Who is not wise above that which is written. Who does not patronize and recommend the truth of God, but delivers it as the imperishable word of the King Almighty, Invisible, and Eternal, and is anxious, only, to know the mind of the spirit in the written letter of the book.

I have heard such a preacher in Calcutta. Not a village curate, but a Dignitary. Not addressing the unlettered inhabitants of a secluded and romantic hamlet, but the polished and fastidious, and preeminently aristocratical European residents in the metropolis of British India. But the Christianty of this man has suffered no deterioration from coming round the Cape. It has lost nothing of its primitive simplicity by being preached in India for many years. It has not been corrupted and compromised to suit the habits, pursuits, and pleasures of those, who too often give themselves a licence here, which they would not indulge at home. No. The preaching of this man is suited to fallen creatures in every place, and in every age. I have heard him again and again. I have heard him where he statedly ministers, and I have heard him elsewhere. I have heard him preach to the crowded congregation, and I have heard him give the word of exhortation at eventime, when the company was select, and the hearers were few. He was still the same. No excuses or extenuations for sin. No letting down of the claims of God's inflexible, and perfect, and holy law. No attempts to lessen man's responsibility. No studious avoidance of particular sins, known to be cherished by those present. No convenient generalities, by means of which men escape from individual liability and conviction. No polite and accommodating representations of the consequences of impenitence. No false views of the mercy of God. No letting off the sinner to another time. No forensic and subtle apologies for the revealed plan of salvation. No, nothing of this sort. He openly proclaims that "*all* have sinned." He descends to particulars. He lays the line and the plummet to the conduct of every man. He sweeps away every refuge of lies. He drags forth the misdeeds of those in high places. He fearlessly rerebukes the varnished vices of the rich, as well as the vulgar vices of the poor. He has a message for the covetous, for the extortioner, for the commercial gambler, for the worldly minded, for the frivolous, for the idle, for the profane, for the unchaste, for the formalist, for the hypocrite. Each of these is found out in his turn. His heart is laid bare in the light of God's word, and his punishment is denounced with the authority of Him, who shall judge the world in "that day." But is he only a Boanerges? Far from it. If he take you to Sinai, he also leads you to Calvary. In every sermon he answers the question of questions, "what must I do to be saved?" He wounds to heal. With him the Law is a schoolmaster to bring men to Christ.

He is not eloquent, as men esteem eloquence. I have never heard him utter an imaginative sentence. I never saw an approach to an effort to produce effect by his manner, or the embellishment of his language. But if, as I believe, a man may be eloquent without imagination, and without a parade of jingling words, and without perfection of utterance, then is the man of whom I speak, eloquent. His eloquence is the eloquence of earnestness, of sincerity, of sympathy, and of an anxious desire to do good to those who hear him. It is the eloquence of a man who feels what he says, and believes it to be of everlasting importance to himself and all other men. The eloquence of one, who living by faith, sees that which is invisible, and speaks of what the eye of his faith perceives, as of a stupendous and overwhelmingly important reality. It is the eloquence of one, with whom time is eclipsed by eter-

nity, the things that are present by the things that are to come, the interest of the body, by the welfare of the soul. Hence, by the solemnity of his manner, and the weightiness of his message, he seems to say—

> No room for mirth or trifling here
> For worldly hope, or worldly fear,
> If life so soon is gone;
> If now the judge is at the door,
> And all mankind must stand before
> The inexorable throne.

Such, Sir, is my sketch of one of the pulpit ornaments of Calcutta. Let it not be said, that there are other qualifications absolutely necessary to secure to a man a large and steady congregation. The preacher of whom I have been speaking, has one of the largest in Calcutta. Should the state of his health demand a temporary absence from his charge, he will, I cannot doubt, be not only followed by the best wishes of those who know him, for his personal happiness and ministerial usefulness during his sojourn in his native land, but the fondest and most fervent prayers for his return in re-established health to the chosen sphere of his labours. Let others talk of "fine preachers" and "beautiful discourses," and of the "astonishing learning" and "profound wisdom" of this man and that man; I am a strong believer in the efficacy of a simple exhibition of the cross of the Redeemer; and as for mere human attainments, though I value them highly in their right place, and when strictly subservient to the spirit and authority of gospel truth, I say with Solomon—He that winneth souls is *Wise*.

CATHOLICUS.

CORRESPONDENCE.

STATEMENT OF THE REV. DR. DUFF'S IMPRESSIONS RESPECTING THE CONTROVERTED POINTS IN THE AUTOBIOGRAPHY, &C., OF THE REV. K. M. BANERJEA.

To the Editor of the "India Review."

Dear Sir,

The apparent scope, design, and object as well as the tone, tenour and temper of sundry recent communications in your Journal from the pen of the Rev. K. M. Banerjea could not fail to awaken in my mind a train of the most painful and melancholy reflections. My earnest wish —yea, my fervent prayer, has ever been that I might be permitted to keep silence. To prevent the unsightly spectacle of a controversy like the present I have borne much, and forborne long. But matters have now come to that pass, not only without my seeking but despite all my efforts to the contrary, that, to remain any longer silent, would be to lie down quiescently under the imputation of tacitly admitting what in my conscience I believe to be little in accordance with reality, charity or truth.

Up to the period of my friend's baptism, and for some time after, I had every reason to be satisfied with his conduct. There was in it much to be admired, and much to be loved. Subsequently, however, many things occurred, at which, either as a Christian or a man, I could not but be grieved. Still, as the convert persevered in clinging fast to the *great essentials* of the Christian faith, I found in that fact abundant consolation for all the ingratitude and ill-usage which, right or wrong, I was led to regard myself as doomed to experience. In this state of things, my path of duty, as determined by a reference to scripture precept and scripture example, seemed plain enough. It was to banish utterly from my mind every feeling of resentment,—heartily to forgive, and, as far as possible, to forget every wrong—honestly to strive to overcome evil with good—invariably to disclose what I knew to be to the credit of the offending party, and as invariably to pass over in silence what I knew of an opposite character,—all, all under the operative influence and spirit of that heaven-breathing charity " which hideth or covereth a multitude of sins."

Nor was this with me a mere abstract theory or speculative resolution. Rigidly and systematically has it been acted on for the *last ten years*, both in India and Britain. In the Appendix to my work on " India and India Missions," will be found the pith and marrow of *all* that I have ever written or spoken concerning the Rev. K. M. Banerjea. And I challenge the whole world to say, whether anything is to be found there, except what is kind in my feelings towards him and honourable in his conduct towards me? No: having no hostile or resentful sentiment in my own breast, I expressed none. Having cordially forgiven all and forgotten much, I rejoiced in dropping the oblivious mantle of Christian love over every thing fitted to resuscitate unpleasant facts with their concomitant painful emotions. Would to God that the same peace-making course had been uniformly followed on the other side! When, at any time, asked, as I could not but often be, why K. M. Banerjea had so precipitately forsaken me and the Christian communion to which I belonged? my usual reply ever was, "that he had doubtless reasons which proved satisfactory to his own mind, and that other parties, who ought to have known better and set a better example, were probably much more to be blamed than himself." Such having been the actual motives and facts of my conduct in this matter, for the last *ten years*, it is, with a sore and heavy heart, that I now find myself imperatively called upon to do what I have *never yet done in print,—never yet done orally in public,—never yet done even in private, beyond the very narrow circle of my more immediate confidential friends*, who already were cognizant of the leading particulars.

When I first saw the Autobiography I sent the author a *private* note, of which I have no copy, but of which I believe the *object* was, *first*, to express my decided conviction that he had allowed his *present* views and feelings and denominational peculiarities to give a *tinge* and *colouring* to his *supposed* views and feelings, ten years ago; and, *secondly*, to express my deep regret that he should have, *needlessly* and *gratuitously*, introduced topics which could not essentially subserve his own cause, while they could not fail to prove offensive to numbers of his fellow-Christians, who also conscientiously believe themselves to follow the pure, primitive, and apostolic model of church dicipline, govern-

ment, and worship. In thus writing, I distinctly told him that, though often provoked, I had hitherto purposely refrained from taking any share in the Church Government controversy—but that I had refrained solely from a love of Christian peace, harmony, and unity, and not from any fear of the result, as far as scripture notices, and apostolic practice, and the unfalsified constitution of the earliest churches were concerned. For if there be, in the wide world, any pretensions more absolutely unfounded, more ridiculously arrogant than any other, they are those of Puseyite High Churchmen and Papists, respecting the alleged "divine right" of anti-scriptural Prelacy, and the alleged talismanic virtues of an anti-apostolic succession—pretensions, utterly disowned and repudiated by the holiest, the wisest, and the best of the Reformers, Martyrs, and Bishops of the Protestant Church of England.

In his reply, my friend appeared to allow the *possibility* of his *present* views affecting and modifying the *past*; and there, I thought, the matter had ended,—as it was not my intention to take any further notice of the miserable affair. But some of my friends, who were tolerably conversant with the *real* facts of the case, felt equally aggrieved at the *partiality* and *one-sidedness* of the statement which had appeared. Under the generous impulse of a respect for the truth, my esteemed colleague, Mr. Ewart, *spontaneously* resolved to present a view of the *other side* of the question. This he did with the calmness and sobriety of a man, who, having no personal share in the original transactions, surveyed the whole with the scrutinizing eye of a disinterested investigator. This called forth a rejoinder from the Autobiographer. Mr. E. replied a second time; and a second time has his Rev. opponent attempted an answer. This answer is of such a nature as *necessitates* me to speak out. And as my friend, K. M. Banerjea, has appeared *thrice* in your columns, it is surely not too much to expect that I may appear *once*,—more especially as I promise you, that, so far as my own wishes are concerned, it is not only the *first* but the *last* appearance, on a subject so truly distressing.

Most of the points which Mr. Ewart has already so successfully sifted and exposed, I pass by unnoticed. All the minor points so irrelevantly and unwisely introduced into the Rev. Babu's second answer I shall also very summarily dismiss. The notable and seasonable discovery that Episcopacy is a sort of *Ecclesiastical Mosaic*, compounded, partly of Episcopacy, Presbyterianism and Congregationalism, may merit the praise of ingenuity as a scape-goat device; but, alas, what, in that case, becomes of the "Divine Right" of Episcopacy, seeing that, instead of being any longer *single* and *exclusive*, it is thereby rendered *tripartite*,—being divided, cantoned, and shared, in suitable proportions, by Episcopacy, *and* Presbyterianism, *and* Congregationalism! What will the high Authorities at Bishop's College and Oxford say to this? The insinuation or surmise as to a possible "tacit reserve" on my part, in regard to the selection of Hill's lectures, is as *new* as it is nauseous to my taste,—smacking as the phraselogy does of a sect and a school whose principles and practices I view with merited abhorrence. The apparent sneer involved in the studied antithesis of such expressions as "Episcopal Church" and Presbyterian *denomination* (the italics are not mine), I simply scout with that calm and unruffled contempt which all such Puseyite and Popish foolery so richly deserves.

The allusion to the dead is surely unkind; or, if meant for kindness, it is surely killing kindness. Mohesh Ghose, one of the rashest but most honest and generous of souls,—for whose good I laboured much and from whom I had much to endure,—sent me a strange and abrupt note, which, considering the peculiar circumstances of the case, I could not but regard as a piece of consummate impudence. *Such* a note I must, doubtless, have answered with a sharpness indicative of displeasure and rebuke. But the author soon saw and acknowledged his error; and, having made the most ample apology,* he was cordially forgiven. And not only so, but the circumstance had been so completely *forgotten* as not to have been once present to my own mind for years; nor would it now have been recalled, had not the over-heated zeal of a mistaken friend raked it from the mouldering ashes of oblivion. The reference to supposed ill-feelings between certain Presbyterian and Episcopalian ministers is as ill-judged, as it is irrelevant and over-done. *If* any unpleasant feelings did *temporarily* arise, at whose door must the blame be mainly laid? Beyond all doubt, at the door of those *Hindu inquirers and converts,* who were wont, with something that looked like shuffling and double-dealing, to go between certain parties, and report, in distorted and exaggerated forms, what unkind things each was *alleged* to assert of the other, and the system to which he conscientiously adhered But, when the native character, with its sundry nameless propensities, came to be better understood, partial misapprehensions began gradually to disappear with the disappearance or diminishing force of the producing cause.

But, leaving all subordinate accidents and accessories, I come at once to the main and central points of the case. In doing so I shall be obliged, in self-vindication, to indulge in a strain which painfully reminds me of the apostolic expression, employed on the subject of a necessitated self justification, "I speak as a fool, yet as a fool receive me."

When I first knew K. M. Banerjea, he had already thrown off the trammels of Hinduism, as the result of the liberal education he had received at the Hindu College. He then appeared, in a loose and negative sense, to be an avowed Atheist. At that time, I believe I was the only European who seriously and systematically tried to draw off his mind as well as the minds of others, from the dreary wildernesses of infidelity to the fair regions of Christian evidence, and Christian truth. To accomplish this hallowed end, I laboured much, both in public and private, and prayed still more. The Lord was at length graciously pleased to grant a measure of success to these unworthy labours and prayers. After eighteen months of incessant exertions, some of those young men, whom I had originally encountered as avowed Atheists,—proud and self-sufficient,—aye, and in some cases, positively rude, insolent, scornful, and abusive,—were led to embrace the faith of the meek and lowly Jesus. What ought to have been the feelings of persons so laboured and prayed for, it is not for me to say. Mohesh Ghose, in his calm and reflective moods, was wont to speak with sentiments of unbounded gratitude; and Gopinath Nundi, the most simple, consistent, devoted, and spiritually minded of all the converts, does so to this day.

It may answer, as indeed it seems to have answered the purpose of others to make light of such obligations; and it would apparently an-

swer their purpose better still, could they, in consistency with recorded facts, evacuate or obliterate the natural antecedents of such obligations altogether. No one felt more strongly than the Apostle Paul the *peculiarity* and solemnity of the bond subsisting between a spiritual father and a spiritual son, begotten by the gospel, in the Lord,—paternal love and sympathy, on the one hand, delightfully reciprocating with filial affection and gratitude, on the other. To propose to *exact* such affection and gratitude were preposterous. It would be like the head of Medusa turning the noblest of qualities into stone. But what it would be unreasonable and wrong to attempt to exact, it might be equally unreasonable and wrong not spontaneously to yield. Far be from me the folly and the presumption of saying what might be the amount of my services, under God, to the Rev. K. M. Banerjea ; or what the amount of his moral obligations in return. As I trust I laboured, not for the honour or the praise of men, but for the good of immortal souls, and with a view to the eternal recompense of reward, gladly, oh, most gladly, do I leave these and all similar points to be unfolded from the register of God's remembrance at the day of judgment.

This much, however, I may surely be permitted to say, simply as *matter of fact*, without trenching on the bounds of propriety, that, having attended, *first*, my lectures on the Being and Attributes of God ; *secondly*, my lectures on the Evidences of Christianity ; and, *thirdly*, my lectures on the Divine Revealed scheme of Redemption ;—and that, having besides had repeated conversations with me in private, as well as some written correspondence, with the view of clearing up certain difficulties, he, at length, voluntarily applied to me for baptism. In consequence of that application, I had still closer spiritual intercourse with him. And to me, who had all along narrowly watched the successive steps in the progress of his varied inquiries and exercises, nothing could be more gratifying than the earnestness, the humility, the child-like docility, devout self-consecratedness, and adoring gratitude to his God and Saviour, which he then so conspicuously manifested. My own heart was filled with the fragrance of a holy joy. It looked like the coming of the morn after a cheerless night. And like morning songs did the voice of Jehovah appear to break forth from behind the clouds of a long dark-frowning Providence.

At that time, I knew well that the convert had *no special* acquaintance with any Episcopalian Minister. At that time, I did *not* know, that he felt under any *special*, far less any *spiritual*, obligation, to any Episcopalian Layman whatsoever. I did *not* know, because neither he himself, nor any one else told me any thing about it. It was some time *after* his baptism, before I heard even a whisper about the matter. And even then, it was only stated in general terms, that, having already cast off Atheism, and acknowledged the force of Christian evidence, and struggled against a lingering Socinianism, his mind, at *the eleventh hour*, derived some benefit from the conversation and example of the respected Episcopalian friends since named. It was at a much later period that I first heard of the *more specific* obligations which he now represents himself as owing to these friends. But, it could not fail to strike the discerning mind as a somewhat odd coincidence, that these more peculiar obligations hould begin to be openly promulged at a time when it might

be deemed expedient to enhance or magnify them as much as possible for the express purpose of diminishing or detracting from what was generally believed, whether right or wrong, to be primarily or chiefly due to one, whose communion had been renounced with a precipitation that seemed to call for *new* arguments to defend it. What! then, do I begrudge these Christian gentlemen, the share which they are *now* said to have had in leading a sinner to repentance—a wandering soul to the Good Shepherd?—God forbid! It is not for such an end that I refer to the subject. I rejoice in any credible proof of their reported usefulness. All that I insist on, is, that *before* Banerjea's baptism, I *knew nothing* of the nature or extent of the obligations *now* claimed for them. I was kept in total ignorance as to the existence of any such. I felt, and spoke, and acted in perfect unconsciousness of any rival, or co-equal, or superior obligations. I felt, and spoke, and acted as a spiritual father towards a spiritual son. And if I laboured under a mistaken or erroneous impression, all I can say is, that nothing was said or done, at the time, to disabuse me of it. This having been the *fact*, what I must ever maintain is, that *if, at that time*, the obligation to others was *really* felt to *the extent since alleged*, I was *not well used*, in being kept *so profoundly ignorant* of it; since, in consequence of such want of openness and candour, leading to the concealment of important facts, I was led—led inevitably—to think, speak, and act under impressions, which, *if more recent accounts be true*, must have been to a great extent unfounded.

Again, *before* his baptism we *never* had *any talk at all* on the subject of Church Government. As to this point I am very positive. In his Autobiography, he states a reason for desiring baptism in my Lecture room—a reason, which *there* appears not only as *the chief*, but the *only* one. Now, I do hereby most solemnly declare that this is a reason, of which I never heard, even in the form of a hint or a whisper, before baptism;—yea, that it is a reason which, to my utter surprize, I learnt for *the first time* in the said Autobiography, published *ten years after the event*. I do assert with equal positiveness, that the reason—the *sole*, the *exclusive* reason—which he gave me, was that which, *in substance*, has been inserted in the Appendix to my work on "India and India Missions," and which has been already quoted by Mr. Ewart. That reason I thought at the time, and think still, was alike creditable to his head and heart. Now if, at that very same time, he was *actuated exclusively*, or even *chiefly*, by the *totally different and less honourable* reason *first* announced in his *recent* Autobiography,—then, I do say, and cannot help saying, that a *disingenuous trick* had been *deliberately practised* upon me. But this I cannot bring myself to believe, and so must conclude that he has unwittingly allowed a lively and inventive fancy, fed and quickened by *existing* views, to feign and imagine reasons which *ten years ago* had *no being*—that he has unconsciously allowed himself to mistake those *posterior* imaginations for *prior* realities—in a word, that he has allowed himself to *antedate*, as reasons, what, *if real*, might tend to throw an air of greater consistency over the transitionary processes of *future* conduct, but what, in truth, can only be regarded as *after thoughts*, the result and product of *after changes*. This, at least, is the

most charitable construction I can put on the matter;—and there I leave it.

Once more, almost immediately after his baptism, he asked me one morning in my study, whether I thought the subject of Church Government to be one which he ought to study. "Not yet,"—was in substance my reply to him, as to all the other converts—"not yet; that is a subordinate subject, and may well be postponed to a later date. The chief thing *now* is to enrich and enlarge the mind with a more systematic and comprehensive view of the grand and fundamental doctrines of the Christian faith. And when this more important object is fully accomplished, then it will be time enough to attend to that which all must admit to be of inferior moment." This advice I gave, because my main object was the enlightenment of his understanding and heart by the rays of heavenly truth—an object which, on principle, I preferred immeasurably to a mere accession in the way of external proselytism to a visible Church.

To the propriety of the advice then tendered, he *appeared* to me *cheerfully to assent*. It was, in consequence, mutually agreed that he should forthwith commence the study of Hill's lectures on Doctrinal Theology. Being then in a sweet, subdued, and delightful frame of mind, it was to me the most pleasant of tasks to be the guide and companion of his studies. Now, when thus progressing for *two or three months*, with Hill's Lectures, I cannot remember having *even once* conversed with him on Church Government; and my own strong conviction is that I actually did not. To do so would have been superfluous. I was under the full belief that he had *cordially adopted* and was *faithfully acting on* my advice, as to the *postponement of the subject to a future time*. And nothing that he said, or did, or hinted, tended to originate in my mind the most distant surmise or suspicion that he was "in a strait"—or that the apparently postponed subject of Church Government cost him a single thought, or ever entered his mind at all, even as a fleeting imagination. Be his intentions or designs what they may, what I asseverate is, that he so spoke and so acted as to leave me under the *distinct impression* that he was *carefully following my advice*, i. e., devoting himself *wholly* and *exclusively* to the study of *Doctrinal theology*, and *not bestowing one thought on the minor subject of Church Government.*

His looking forward with apparent delight to his partaking of the sacrament of the Lord's Supper in the Scotch Kirk, only tended to lull all suspicion and confirm me in my belief. Judge then of my unfeigned surprise and astonishment, when, late on the Thursday evening, previous to the dispensation of the Sacrament in our Church, he dropped the *first obscure hint* on the subject. From the greatness of my surprise, and the suddenness and unexpectedness of the hint, I remember the circumstance as vividly as if it were yesterday. There was, as usual, a *preparatory* service in the Scotch Church, that evening. As it was about the middle of the cold season, and a fine moon-light night, I resolved to walk home. My friend, *who attended the preparatory service*, accompanied me along the Lall Bazar to where it crosses the Dum-Dum Road. Thence, he was to proceed home in the direction of the Hindu College, and I, towards Wellington Square. Having already said to him all that I

intended respecting the nature of the sacred ordinance, while in the act of shaking hands with him and bidding him good night, I remarked to this effect "well, if we do not meet before Sunday, we shall then, God willing, meet at the Lord's table." The instant reply was "*I am not sure.*" If, in a calm and cloudless sky, I had been struck by a thunder-bolt, I could not have been taken more aback "What," said I, under the influence of so sudden a surprise, "what is the matter?" —"I cannot tell you now," was the reply, "but I'll let you know to-morrow." Next morning, *a very short* and *very cool note* was received, to the effect, "that his mind had begun to entertain doubts on the subject of *ordination*, and that till these were resolved, he thought it better not to receive the sacrament at our hands."

This, then, I aver was the *very first* hint I received of his being "in a strait"—the very first hint I received of the subject of Church Government having seriously crossed his mind, since the morning when he appeared to approve of my counsel to *defer the study of it* altogether. I felt naturally hurt and grieved at the unexpected discovery. Still, I had no suspicion of his honesty,—none whatsoever. And, in the absence of further explanation, my own solution, in the simplicity of my heart and the fullness of my confidence, was, that as he had during the immediately preceding Christmas holidays, been spending some time with Episcopalian friends, he had then, for *the first time*, learnt something from them which operated as a disturbing force,—that, consequently, the doubt, hinted at on Thursday evening, was of *very recent* growth,—that it had only sprung up within the *preceding* days,—and that he was not so much to be blamed as the indiscreet and injudicious partizans who had taken undue advantage of his plastic and wholly unfurnished mind to inculcate certain nostrums on the subject of *ordination*. This was the only creditable theory which external circumstances could enable me to form. And it is but the bare and naked fact, that nothing afterwards occurred to open my eyes to its erroneousness till the *novel* revelations of the *recent* Autobiography tended to dissipate it into shreds.

Subsequent to the unexpected disclosure now related, we could not do otherwise when we met than occasionally allude to the subject of Church Government. These, however, were but cursory and unconnected allusions. No full or coherent view of the unassailable grounds of Presbyterianism were ever sought for, or received from me, or any of my friends. So far as we knew, the claims of Presbyterianism were never freely, or fairly, or properly investigated at all; rather, they seemed from the first, and at once, to be rejected with a sort of disdainful and instinctive incredulity. On the contrary, the claims of Episcopacy seemed from the first, and at once, to be admitted with a sort of instinctive and all-devouring credulity.

But, it was not the loss of K. M. Banerjea to the Presbyterian communion that I regretted,—even if that loss had been greater than time has proved it to have been. No: I told him at the time, that, while I could not but regard his treatment of myself and Presbyterianism as little else than insulting, I was still happy in the belief that he had what was far better, *soundness in the faith*—that, when he had become, as I hoped, a *sincere convert*, my *great work* in his case, as a humble instrument in the hands of Providence, *was done*,—and that I should for ever rejoice in his increasing spiritual prosperity and labours of love in

the Lord. But, what I did truly regret in the matter was, the alienation of feeling to which I foresaw the change would eventually lead,—the disruption of contemplated schemes of combined or co-operative usefulness which would inevitably ensue,—the introduction among young inquirers of a new element of disturbance and strife, and keen debate,—the commencement of a system of disaffection towards spiritual instructors, and of facile, senseless, or narrow minded proselytism from one denomination to another,—and the establishment of a future rallying point and head quarters for all the restless, the dissatisfied, and the worldly minded. Nor was I mistaken in these sad forebodings! Most of the inquirers who were wont to come to me, soon caught the infection. And, instead of seeking earnestly the right way of salvation, precious time was almost daily misspent in disposing of idle cavils and quibbles, or in answering frivolous questions respecting the right way of Church policy! Satan's kingdom had received a shock by the succession of baptisms which had taken place; and it now seemed to be his turn of retaliation and triumph, in sowing the seeds of discord and disunion, and in drawing all inquiring eyes away from the life-giving doctrines of the cross, to the soul-withering forms and formalisms of ritualistic genealogies.

Now, on calmly reviewing all the facts and circumstances that transpired *before*, *at*, and for *two or three months subsequent* to his baptism, at what conclusion am I to arrive? If, as he now says, I lay under mistakes as to his views and designs, then, must I ever maintain that his own words, and silence, and external acts rendered such mistakes not only natural but absolutely inevitable. If I was the victim of illusion to the extent now alleged, then, must I ever maintain that it was because I gave him credit for acting towards me in a fair, open, and honourable way, when such credit was not really due. By the resistless force of my own memory and consciousness, I am driven, literally driven to this alternative, EITHER, that the *autobiographical account* of things is *erroneous*,—in other words, that the author has allowed his *present views* to *tincture*, *colour* and *bias* his *recollections* of the *past*—that under the blinding influence of this bias, he has thrown views and feelings, which are honestly cherished *now*, *back* to a period to which they do *not chronologically* or *historically belong*, in order, by a species of *prolepsis*, to anticipate and plausibly account to High Churchmen for the distressing fact, that he was baptized by a man not Episcopally ordained!—OR, that the Autobiographer, *for a length of time*, acted towards me in a way the *most unfair*, *uncandid*, and *disingenuous*.

This is the alternative, the only possible alternative which suggests itself to my mind. To either branch of it, I am driven by a sort of moral compulsion. If left to myself I would still adhere to the former as by far the less obnoxious and dishonorable. And, indeed, in spite of all apparent reclamations to the contrary, I cannot divest myself of the belief that it is the right one. But, be that as it may, the die is now cast,—and there let it lie. The Rev. Autobiographer has given to the world, in *three* successive papers, what he conscientiously believes to have been his own views and impressions; and these I presume are unalterable. My friend Mr. Ewart and myself have now also stated, in *three* successive papers, what I as conscientiously believe to have been my own views and impressions; and most assuredly, these are unalterable. All the ingenuities and plausibilities of human wit, supplemented

though these might be by the most recent hair-splitting subtelties from the prolific mint of Jesuitism, cannot efface what has been engraven as with a pen of iron on the tablets of my memory, or eradicate what has been inwrought and incorporated with the very staple and substance of my conscious being. Between our several views and impressions, there are not only considerable but apparently irreconciliable discrepancies,—proving that not a little misunderstanding must exist some where. But, as individual impressions are incommunicable, who is to judge between us? Or how are these differences to be rectified and adjusted? The thing seems impossible. There are no adequate data, no sufficient materials, for the purpose. This being the case, what good or wise purpose will it serve to prolong a recriminative logomachy? None whatever. Each party having now fully expressed and published his individual convictions, the curtain of controversy ought at once to drop. As time can shed no farther light on our darkness, or unravel one more of our perplexities, to write any more on the subject would only be to pile up a heap of worthless repetitions, and could lead to nothing but profitless confusion. The whole, therefore, ought now, and for ever, to be peacefully handed over to the final and unerring decision of the Great Assize.

I have now discharged one of the most painful tasks I have ever been called on to perform—a task, which, for *ten long years*, I had strenuously laboured, by silence and charity, and all other means short of sinful compromise, to avoid or render unnecessary. If I erred at all in reference to the earlier converts, it was in being *unduly*, perhaps, *almost idolatrously* attached to them. That such attachment was *natural*, who will deny? I knew them, when they could scarcely be said to know themselves; and certainly when they did not know the plague of their own hearts. I knew them, when in their state of rebellion against the Lord and his Anointed. When shunned by other Christians, and even by many Hindus, as the pests of society. I followed them into the waste howling wilderness of their mazy errors. When my beseeching voice was often treated with contumely and scorn I still reiterated the call. Through all their devious wanderings I tracked them. With glistening eye and a prayerful heart I was wont to watch, when they little thought and still less cared that any mortal was concerned,—for what gave themselves no concern—the salvation of their precious, their immortal souls. Others read or heard only of their real or alleged outrages against truth, propriety, and decency; I knew, at the same time, their peculiar trials, difficulties, and temptations, and felt disposed to make larger allowances,—often vindicating, when others greatly blamed. Others, only witnessing or hearing of the unfavourable features in their character, were ever ready indiscriminately to condemn; while I, being equally acquainted with the many redeeming excellencies of their character, felt always more ready to commend. Yea, such was the intenseness of my sympathy with them in their varied and desperate struggles to emancipate themselves, amid many failings, mistakes, and inconsistencies, from the horrid yoke of superstition and infidelity, that, when at length, in the estimation of charity, some of them reached the quiet haven of rest and peace, through the atoning blood of the LORD OUR RIGHTEOUSNESS, and the sanctifying grace of the HOLY SPIRIT, I felt an irresistible propensity to hide

or cover or sink into oblivion the multitude of all their former short-comings. I could not speak ill of them myself; I could not brook such ill-speaking in others. In short, I loved them with the freshest, warmest, sincerest love. Ah ! but did I not thus err in the other extreme? Was not my heart too much set upon them? Did I not love them too much? The correctives of a gracious Providence have since driven me, first to suspect, and next to conclude, that I did. And if so, most severely, though most righteously, have I been punished. For, in succession, *every one* of the earlier inquirers and converts, *without exception*, has been severed from me and the mission to which I belong. If my *heart-attachment* was *strong to excess*, it was of necessity wrong in itself, and offensive in the eyes of a holy God. And if so, it has been in mercy to my soul, that he has visited me with rebuke and chastisement. To thy righteous award, Oh my God, grant me grace to enable me to bow with lowliest reverence and deepest self-abasement !

Towards such of the inquirers and converts as are yet alive, I still cherish, and cannot help cherishing, sentiments of a kind altogether peculiar and inexpressible. Many things in their conduct I have had reason to mourn over in solitude, and in silence. More especially have I lamented the handle which some of them have apparently given, both to friends and foes, for the suspicion that they may have been actuated more or less, by motives of a carnal and mercenary character. Nevertheless, my own heart still breathes towards them nought but kindness and love. My constant prayer is, that they may yet so speak and so act, as to *live down* all sinister interpretations of their conduct. Glorious and immense is the field that is before them. Glorious and immeasurable is the recompense in store, if they enter it in the *true evangelistic and apostolic spirit.* For this end, let them utterly disdain the crooked and labyrinthine policy of the Heathen. Let them wholly eschew all idle gossiping, back-biting, and tale-bearing. Let them repudiate the blighting spirit of ungrateful disaffection and restless discontent. Let them shun all carnalizing discussions about increase of salaries and relative status or rank, whether in native or European society. Let them reduce to their proper dimensions the beggarly elements of rites and ceremonies, and outward observances. Let them not confound *mere innovation* in what is arbitrary or conventional with *true renovation* of life and character. Let them carefully distinguish between *heart-conversion to God* and *formal proselytism* to a denomination or sect. Let them not mistake the mechanic drudgery of ritualistic motions and actions and changes for the divine life of faith in the soul. Let them pass away from "the letter that killeth" to "the spirit that maketh alive." Let them dismiss for ever all the soul-debasing dogmata of manual successions and patristic traditions, which would reduce lofty heaven-aspiring Christianity to the same dead level as the hereditary castes and Rishic legends of Brahmanism. Let them shake themselves loose from all such enthralling clogs, impediments, and hindrances. Let them awake to a high sense of duty and the noble position which they occupy. Let them arise in the might of Divine Faith, the fervour of Divine Love, and the energy of Divine Truth. Acquainted from infancy with the vernacular tongue ; inured to the climate ; and habituated to native modes of thought and feeling in a way that foreigners can rarely equal,—let them turn their almost incom-

municable advantages to proportionate account. In the sublimest and the best of causes,—the evangelization of perishing heathen,—let them acquit themselves like men. Let them set an example of spiritual heroism to their benighted, besotted countrymen, and to the world at large. Let them earn the name and the praise of Reformers by leading the lives and achieving the deeds of Reformers. Let them vindicate their claim to the title of apostolic men by faithfully emulating and exhibiting apostolic practices. Above all, let them secure the approbation of the great God, by spending and being spent in his blessed service. And while angels in heaven may be made to rejoice over sinners brought, through their instrumentality, to faith and repentence, future generations on earth may yet call them blessed.

I remain, Your's &c.

ALEXANDER DUFF.

Cornwallis Square, 1843.

P. S. Mr. Ewart, having understood that I was to present my own statement, writes to me that he does not deem it necessary to reply again, since, so far as he is concerned, there is little or nothing to reply to. He feels more strongly than ever that the Rev. Babu's own letters "place him in a very awkward predicament,"—that like others, hard pressed for argument, he has "unfairly *transposed* some of his opponents (Mr. E.'s) expressions, applying and quoting those employed in reference to one part of his argument, when he himself is referring to the other part,"—that, in his last reply, "he has so shifted his former ground as regards some leading points, as to have effectually answered himself,"—that, as to making "personal inquiries at the Rev. Babu, respecting his reasons for leaving the Presbyterian Church, the information received from others did not lead him (Mr. E.) to suppose that any good could result from a communication with him on the subject,—that "the *ostensible* facts of the case were known to others, who never could learn from any one the *real* grounds and reasons of the change,"—that the whole subject "might have been allowed to slumber as it had done, for the last ten years, had not illjudged sectarianism on his part, or that of some one else, led to its unpleasant and unprofitable revival,"—and finally that as the "author will not allow him (Mr. E.) to attribute the statements in the Autobiography to the influence of opinions which have now been exerting their influence with constantly increasing force for nearly ten years, he is shut up to the conclusion that the Rev. Babu acted a *very uncandid* part in so studiously concealing his real sentiments both before and after his baptism."

[Our readers will, we trust, give us full credit for the assurance that we have, throughout this most painful and distressing discussion, been actuated only by a desire of affording to the gentlemen who have been engaged in it the fullest opportunity of stating and explaining their respective opinions, views and impressions. Under this feeling we have as readily given insertion to the preceding letter of our respected correspondent, Dr. Duff, as to any which have appeared on the subject, and—if we have been enabled accurately to analyze our own impressions—perhaps the more cheerfully that it [illegible]ared to us only necessary for Dr. Duff to speak out for himself on a matter so closely affecting his own character, conduct and views, to put the question at rest for ever. Six papers

have now appeared on a subject which, though it may have failed to interest the general reader, cannot but have excited, in many minds, emotions of a very painful and disturbing character. Three papers on each side, including the statement in the Brographical notice, are now before the public; so far the balance of number is struck, and from these, we think, enough can be gathered to enable unbiassed minds to arrive at just conclusions. As little more, we apprehend, can be said, either in charge or in justification, we hope that we incur no risk of having our motives or our feelings impugned when we venture to express our earnest request that—so far as controversial discussion is concerned—the subject may now be permitted to rest, as no good to the cause of truth or humanity can be expected from a farther intrusion of it on *public* attention. We can testify that Dr. Duff has already cordially responded to our wishes on this head by at once withdrawing a remarkable document, that tended to invalidate some of the statements of the Rev. K. M. Banerjea, when it was pointed out to him that the introduction of new materials would have a tendency to prolong the painful discussion, by provoking fresh replies and counter-replies. No *essentially new* matter being now introduced, and each party having fully stated his own views and impressions, we must re-iterate the earnest request that the whole be now considered as finally brought to a close.]—Ed.

Intermittent Springs.

To the Editor of the "India Review."

Sir,

Philosophers have not, I believe, entirely satisfied each other as to the theory of springs: conflicting opinions prevail on this as on many subjects of perhaps equal or greater importance. This need not surprise us, for I can well conceive the difficulty of accounting for, or reconciling to any single theory, the various and very dissimilar phenomena they present.

I need scarcely remind you of the celebrated intermittent spring of Fonsanche, which flows daily for about 7 hours, ceases, and after a rest of 5 hours commences again; and, not less singular, of that of Calmars, whose flowings intermitted every 7 minutes. The great earthquake of 1755, which destroyed Lisbon, caused the fountain to flow continually for about 8 years, after which it resumed its old intermittent habit. Drunken Barnaby, in his Itinerary, thus speaks or writes, to the best of my recollection—for I quote from memory—of an intermittent well or spring somewhere in Yorkshire :—

> By the way side, as the Travellers go,
> There is a well that doth both ebb and flow,
> But they know not, who by it do travel
> Whether it comes from salt or gravel.

These are all curious enough in their way, but I have lately been informed of one of a more singular character than any which has ever come to my knowledge. It is a well of good fresh water at Newton in Glamorganshire, within a quarter of a mile of the sea. When the tide is full, the well is dry, but when the tide is out there are 6 or 7 feet of water in it.

I shall be obliged to any of your correspondents who will favour me with any explanation of phenomena of so very singular a nature.

I am, your's,

March 5th, A WELL-WISHER.

INVOLUTION AND EVOLUTION.

"*Hæc placuit semel; hæc decies repetita placebit*"—HORACE.

To the Editor of the 'India Review.'

SIR,

Mathematicians have had various methods of involving and extracting Powers and Roots, of which the most essential are the square and cube. Having had much to do with extensive ranges of figures, I was anxious to discover some simple method, by which such roots and powers could be worked by the smaller Tables, which extend from 1 to 1000, as may be seen by reference to the works of Messrs. Charles Hutton and Olinthus Gregory; and although I have computed a greater series of squares extending from 1 to 100,000 which comprize two large volumes of manuscript, as I apprehend few would patronize their publication, so as to defray the expense of the same in this country, I have employed a small part of my leisure, in ascertaining the Rules which appear to me sufficiently true, and may therefore be acceptable to mathematical computers; and as the India Review is particularly adapted to such articles, I cannot do better than solicit the insertion of the following, which seems to possess some originality, and as comprising a reciprocal series, would be much more speedy or permanently impressive, since the ordinary Rule of the cubic series of roots can hardly be retained in recollection.

I shall commence with the Square as a Power, secondly give the Cube and then the inverse application to their respective Roots.

The Square as a power:—or to find the power of any given number by the tables published by those celebrated mathematicians: such as the square of 864·95. To apply this number to the algebraic formula $x^2+2\ ax+a^2$ it is necessary to assume the whole number 864· as equal to (a) and the decimal ·95 as equal to (a.) Now although the entire number may be a whole number, their published tables of Roots not extending above 1000;—the additional two figures may be nevertheless marked off as decimals, until the whole operation is concluded:—

$$\left.\begin{array}{lll} \text{Then we have } x^2 = \overline{864\cdot}^2 & = & 746496\cdot \\ a^2 = \overline{\cdot 95}^2 & = & \cdot 9025 \end{array}\right\} \text{Had from the Tables.}$$

$$2ax = 2 \times \cdot 95 \times 864\cdot \ = \ 1641\cdot 60$$

The value of the square $=$ 748138·5025 which may entirely be a whole number if 86495. was given as such whole number:—the number corresponding most precisely with that, had in my extended tables viz. 7481385025.

Here it will be understood that the labor of multiplication is much reduced.

I work a Cube by a similar process; supposing the cube of 86·4 be required to serve as an example,—the Formula deduced from $\overline{x+a}^3$ is $x^3 + 3\ ax^2 + 3\ a^2 x + a^3$: whence

$x = 86\cdot$ and $a = \cdot4$

$x^3 = \overline{86\cdot}^3 = 636056.$ per table

$a^3 = \overline{\cdot4}^3 =$ $\cdot064$ per do. and $x^2 = 7396\cdot$

$3\,ax^2 = 3\times7396\cdot\times\cdot4 =$ $8875\cdot2$ $a^2 =$ $\cdot16$

$3\,a^2x = 3\times\cdot16\times86\cdot =$ $41\cdot28$

Equal to the cube of $86\cdot4$ $644972\cdot544$ corresponding with the higher number against 864 given in the tables as 644972544.

From the foregoing examples it will be evident that decimal numbers in given *roots,* may be employed as (a) in the formula, the *whole number* being taken as (x) in the same :—which application has not I believe been enunciated, by any other mathematician.

I shall now expound the application of the foregoing theory to the extraction of Roots. Here the square-root is shortened by subtracting the number from the Tabes and making twice the Root found, as the divisor for the remainder, but in a somewhat different mode from that commonly pursued:—

Thus the number given for extraction of the

Square root is 748138·5025 — Root

Find its next power 746496. — per table = 864·

2

Difference 1642·5025(·95 twice root 1728·

Root ×2=1728×·95 = 1556·01 — ·9

$2ax + a^2 = 1641\cdot60 + \overline{\cdot95}^2 = \cdot9052$ . . 86·4925 — 1555·2

+ square ·9 — ·81

·9025 — 1642.5025 — 1556·01

Sum = 1642·5025 **** ****

Thus twice the Root found, per Table, being the approximate divisor ; the following numbers will coalesce with the exponent (a) of the Formula.—The usual method of extraction is simpler.—However, the Cube-Root, seems better to answer for improvement.—Thus the Cubic

Formula $x^3+3ax^2+3a^2x+a^3$ being analyzed

stands thus, $x^3 + 3x^2 + 3x$ ⎫ a new mode of

$\times \quad \times$ ⎬ expression by

$a \quad + a^2 + a^3$ ⎭ analysis.

Supposing the Cubic Root of 926859·375 be required

The next lowest Cube

per table will be found 912673· for 97·

Remainder 14186·375

Then say $\overline{(x+x^2)\times3}$

as (97·+ 9409·)×3

Equal to 291·+28227· ⎧ which as a divisor

× × ⎩ will find .5

Then × .25 + ·5 +.125

Products—— 7.275+14113.5 +.125 = 14186 . 375

No Remainder * . *

It will be remarked by the foregoing exposition, that the decimal runs $\cdot 5 + \cdot 25 + \cdot 125$: as $a + a^2 + a^3$; and the whole number by the Table as $97\cdot + 9409\cdot + 912673$. which first two being multiplied by $3\cdot$ and inverted against the first mentioned series

$$\text{As} \quad (9409\cdot + 97\cdot) \times 3 =$$

$$= 28227\cdot \times \qquad 291 \text{ as } \left\{ \begin{array}{l} \text{root and} \\ \text{power} \end{array} \right\} \text{of } x^2 + x \times 3$$

Respectively multiplied by $\cdot 5 + \cdot 25 + \cdot 125$ as powers of a, inductive

$$\overline{14113\cdot 5 + 7\cdot 275 + \cdot 125} \left. \right\} \text{give the summation equal to the difference.}$$

The divisor being easily found by adding the square and root, first found and multiplying them by 3 ; the quotient will be the smallest root to be taken in square and cube by the tables.

However opinions might run counter to these schemes of Algebraic analysis and synthesis ; the desideratum of application will consist in the use of the exponent as a positive decimal, which I believe no predecessor has yet proved.

C. HUDSON.

[We publish the communication of our esteemed correspondent rather on account of the interest which is always attached to local contributions than from a conviction of its practical utility and novelty. There is, we think, some obscurity in the concluding paragraph, and in one relating to the extraction of the square root which, if we be right, many of our readers will be at no loss to find for themselves.]—ED.

PAPER FOR LITHOGRAPHY.

To the Editor of the 'India Review.'

DEAR SIR,

As your pages appear open to those who seek, as well as to those who give information, I am induced to assume the former character and trouble you with a few lines.

Amidst the numerous difficulties and annoyances which attend the useful art of Lithography in India, my attention has often been directed to one which may, I am led to hope, admit of help. I allude to the *paper* upon which, for want of some material cheaper and more easily come-at-able than English plate paper, or the still more expensive and beautiful commodity of China, it becomes necessary to print, not only plates of inferior consequence but of delicate and laborious workmanship.

Lithographers, whether professional or amatuers, can alone feel the importance of the matter I am troubling you upon, but those who have the least knowledge of an evil are not necessarily the least able to afford hints for its remedy.

Plate paper, be it understood, is that very beautiful description of paper upon which European lithographs and engravings are printed, and may be immediately known by damping the corner with a drop of water, which will immediately sink through as in blotting paper.—*It is devoid of size.*

Now, not only is this commodity not procurable in India, where there does not appear to be sufficient encouragement to induce its exportation into *the market*, but, of course, is excessively expensive when procured, as it must be, by importation on Europe through agents, who can only *ask* for the *best* and *pay* the *best price* for it,—the one being often as unnecessary as the other is disagreeable. What, therefore, I am desirous of learning either from yourself or some of your scientific or experimentalizing correspondents, or of directing the attention of our few paper manufacturers to, is, whether it be possible, by any chemical or other means, and without injuring the texture, *to discharge the size* from any of the common printing or writing papers, so abundantly available, or from any of the produce of China, some of which is both fine in texture, large and thick, and is in its colour identical with the beautiful and delicate plate paper, which under the denomination of '*India proof*' is in so much demand in Europe, and, wonderful to add, amidst all the improvements and perfections of her arts and manufactures, remains, I believe, not only unequalled but un-imitated! Can any of our paper makers here tell us why this is so, or say whether it is not possible on their own parts to manufacture a description of plate paper for the Calcutta market, sufficiently good at least for Maps, Charts, plans, and magazine plates, and whereon, let me add, Printers may contrive, uninterruptedly, to print a hundred or two plates in a morning instead of, as is sometimes the case, spoiling a Lithograph in less than ten impressions with the common paper, and this despite some four or five days soaking in both hot and cold water! I should add, with respect to the common China paper, that it contains not only size but some powerful astringent matter, probably alum, highly injurious to a Lithograph. But for these faults, China paper would present an excellent printing surface, an illustration of which, in type printing, may be observed in a Macao publication termed the "Chinese Repository" which is printed upon no other.

Your's Obediently,

LITHO.

THE COMET.

Calcutta, March 1843.

After our article on the Comet was in type we were favoured by an intelligent correspondent with the following statement of its observed position and bearing on the dates severally noted.

We heartily commend the example of our friend to the notice of other observers who may possibly have had more frequent opportunities than we know him to have possessed. For ourselves we shall be obliged, and we are assured that communications, however slight, on a subject of so general an interest will be as cordially received by others,

OBSERVATIONS.

9th March at 7h. 5m. P. M.

Comet distant from Sirius	78°	17'	25"
Ditto ditto from Capella	77	39	45
	h.	m.	
Making its R.A about	1·	10·	
And Declination South about	13°		

Length of tail about 50° And its angle at setting 46° South of the perpendicular.

11th March at 7h. 7m. P. M.

Comet distant from Sirius	72°	36'	42"
Ditto ditto from Capella	73	55	
	h.	m.	
Making its R.A about	1·	22·	
And Declination South	12°	20'	
Length of tail	42°		

18th March at 8 P. M.

Comet distant from Sirius	56·	22·	45
Ditto ditto from Capella	63·	53·	45
		h.	m,
Making its R.A about		2·	45·
Declination South	10°		
Length of tail about...	34°		
And its angle with the perpendicular at setting	37°		

A fourth observation was attempted on the 29th of March, but from the increasing faintness of the Comet, and other causes, the results could not be depended on; the only point determined, with any degree of satisfaction, was the length of the tail, which at 7h. 35m. was about 26° 30'

An Extract from the Log Book of the "Tigris" Capt. S. McGill, from Liverpool says "Saw the Comet on the 3d March in Lat. 10° South, Long: 25° West. On the 8th March very brilliant tail measured 45° 30': Was last seen on the 21st."

Our artist has furnished a representation of this very interesting object, as it appeared on the evening of the 9th of March.

Its inclination, length, and position amongst the heavenly bodies are laid down with tolerable accuracy.

The nucleus of the Comet appears in a cluster or group of stars of the third magnitude, situated in the body and tail of the constellation Cetus: inclined at an angle of about 45° from the perpendicular, the tail passes through the constellation Eridanas, terminating a little beyond Gamma in the direction of the constellation Lepus, towards Sirius. The Star beneath Sirius, on the left hand side of the plate, is Canopus.

The Poets and Poetry of America; with an Historical Introduction. By Rufus W. Griswold, Philadelphia, 1842.

It were a slander upon the much-vaunted intelligence and taste of the nineteenth century to expend a single sentence on an exhibition of the high place that literature occupies among the pursuits of man, or of the high place that is due to poetry among the departments of literature. However vague notions men may have as to what constitutes poetry, and however few might be able to give any thing like a rational definition of it, almost all are equally willing to admit that a poet is the highest style of intellectual man. We differ not from the general opinion, provided that poetry be understood in its highest and noblest sense;—as the product of pure genius,—the expression of noble and lofty sentiment—the language of spirit as contradistinguished from that of ordinary materialism;—the developement in language of the influence of the beautiful, the good and the lovely upon the soul capable of receiving their impressions;—the worthy record of the intercourse that the gifted soul is permitted to hold with the immaterial and unseen, though not on that account the unreal world. Such, in our estimation, is poetry; and in this sense it is the language of the noblest and loftiest intelligences in the universe. It is the language of the Cherubim and the Seraphim who shine and burn as they encircle the Centre of uncreated light and love;—It is the language that is to be learned by those of the children of men who are to be admitted into the glories and the blessings of the upper Sanctuary. It is the language of spiritual beings. It is, let it be reverently said, the language of God himself. Are we to listen then for the utterance of this voice by earth-dwelling man? Yes, verily. He will speak it undoubtedly with stammering lips and faltering tongue, and strangely as it comes from his lips would it sound in the ear of one whose native language it is; still speak it he must, or he is not entitled to the name of a poet; and just in proportion as this heavenly spirit animates any composition, is that composition poetical. Where the spirit of poetry is at all, we acknowledge the claims of the composition to rank as poetry: when it is wholly absent, all the rhyme that vocables can be made to express is but a jingle, all the language of passion is but bombast and rhodomontade, the composition is essentially and irremediably prosaic. It may resemble poetry, even as the chiselled marble may resemble the limbs and features of a living man, and the deception may be so complete as that the ignorant shall bow the knee before it, but all the while its substance is as cold and lifeless as is that of the block still unmoved from the quarry; or a composition may have somewhat the same relation to poetry that a skilfully constructed automaton has to a living man, producing by means of springs, and pulleys, and cranks, and wheels, a few imitations of those motions that flow spontaneously from the action of the will upon animated matter. Yea, we may suppose for a moment the dreams of the alchymist realized, and a mass animated by the infusion of the *elixir vitæ,* the essence of mere animal life apart from all the nobler powers and sympathies that constitute and adorn

the intellectual and moral nature of man, the monster thus called into being might also find its counterpart in a large portion of those compositions to which multitudes would deem it madness to refuse the name of poety.

Such being poetry, and such and so many the counterfeits that usurp its name, a nation's poetry is the index of the nation's character, nor the index alone, but in great measure also the former of that character. No nation is truly great that has not a great poetry; no nation is, or will long continue, small, that has given birth to great poets. England is the greatest nation on the face of the earth, and the English poets are the greatest in the world. Separated from England by a narrow strip of water, with nearly the same climate, and with superior advantages in a multitude of respects, France is neither poetically nor nationally great. The mutual action and reaction of national poetry and national character upon each other is one of the most interesting subjects of investigation that can engage the attention of the philosopher. We know that each tends in some degree to produce the other, but to what extent either is the cause, and to what extent the effect of the other, it would require a long space to shew, and an extensive induction of particulars to determine. It is partly true that England is so great because her poets are so great, and partly true that English poets are so great because their country is so great. If France could give birth to great poets, the national character would speedily rise; or if the elements of greatness were infused into the national mind, one of its earliest manifestations would be the production of great and good poetry. This mutual reaction of character and poetry upon each other renders a nation's poetry a record of the past, the present and the future history of its moral and religious character, and consequently of its rank in the scale of nations, and its influence upon the well-being of the other nations of the world. Of the past—for although in the course of ages there may arise some one mighty mind, "born not made," who may break forth like a solitary star in the darkness of a beclouded night, yet there cannot be a national poetry until the national mind and spirit are so attempered and developed as to foster its production;—of the present—for while it is the peculiar privilege of poetry to be conversant with the ideal and the unseen, it is no less its part to reflect the existing, even as the pure light that comes from heaven is modified and tinged, and even beautified by those very objects to which it imparts all their beauty;—and of the future,—for the poetry that is worthy of the name of national will and must exercise a most potent influence on the character and destiny of future times.

The editor of the volume before us seems to have *somewhat* different views regarding what poetry is from those that we have attempted to express, or rather he has condescended in the filling up of his volume to the erroneous notions and perverted taste of others; but whether for the sake of pleasing them, or of encreasing his own remuneration by enlarging his book, or of deluding the ignorant and unthinking part of his countrymen into the belief that they are vastly richer in the commodity of poetry than they really are, does not very clearly appear. "In selecting the specimens of this work, (says he, in his address to the reader) I have regarded humorous and other rhythmical compositions, not without merit in their way, as poetry, though they possess

but few of its true elements. So many mistake the form for the divine essence itself, that I might have experienced difficulty in filling so large a volume, had I been governed by a more strict definition." This we fully believe, but we should like to know under what necessity the editor lay to fill 468 large octavo pages (double columns). If he wished his volume to benefit his countrymen, would it not have been far better to have endeavoured to open their eyes to the true nature of poetry, than to minister to their prejudices and perpetuate their delusions by countenancing the heretical notion that mere rhyme and humour constitute anything to which the name of poetry can be without desecration applied. The book would have been a far better book for the reader if it had been reduced to one half its size, and perhaps better still if the remanent half had been halved. But, for the purposes of the critic it is perhaps better as it is, as shewing, according to our introductory remarks, what past America has produced, and what is to be employed in the production of the America that is to be.

There is much in the scenery and climate of America calculated to develope the poetic mind. Every thing in external nature is on a large scale. Nowhere does the power of the Creator display itself in more grandeur and magnificence. Majestic forests and noble rivers, boundless plains, and sunsets full of glory are there. A variable but temperate climate presents these natural objects in ever-changing phases. And the red man, with all his mysteriousness, is, or alas! *was* there. Education is universally diffused, and there is a reading "public" large enough for the content of any poet's heart. But the demon of utilitarianism, the worst enemy that the spirit of poetry has, is there. Mammon has established his temple in every corner of every thoroughfare, and his worshippers, like the youthful Hannibal, swear on his altar eternal enmity to all that does not directly and immediately tend to increase their gains, and hasten on the march of external and visible and material "improvement." The demon, too, of politics has seduced multitudes there, and filled their hearts with apathy and callousness. National vanity predominates over multitudes, and fills them with admiration of the little and the mean, and narrows and degrades their souls. In some parts of the land, too, oppression holds her seat, and the groans of enslaved brothers sear and brand the souls of men, and incapacitate them for holding converse with aught that is beautiful and good.

With all these disabilities is it to be expected that poetry should flourish? assuredly no; and those who have been able to surmount all these, and to triumph over them, are the more entitled to our admiration and regard. That such there are the volume before us contains full proof, and it shall be our pleasing task now to record the names of some such, and to lay some specimens of their best productions before our readers.

First, in our estimation, is Richard H. Dana, one of the few American poets known in Europe. He has not written much, but, far better, he has written well. The paucity of his writings, the editor of the work before us imputes to the smallness of the remuneration that he received for his first works. His longest poem is the Buccaneer, given at full length in the collection before us. It is a tale of horror and is well wrought out.

We subjoin a short and very favorable extract from a poem called the "Husband's and Wife's grave." The extract is headed—

INTIMATIONS OF IMMORTALITY.

A voice within us speaks the startling word
"Man thou shalt never die!" Celestial voices
Hymn it around our souls; according harps
By angel fingers touched when the mild stars
Of morning sang together, sound forth still
The song of our great immortality!
Thick clustering orbs, and this our fair domain,
The tall dark mountains and the deep toned seas,
Join in this solemn universal song.
—Oh listen, ye our spirits! drink it in
From all the air! 'tis in the gentle moonlight;
'Tis floating in day's setting glories; night
Wrapped in her sable robe, with silent step
Comes to our bed and breathes it in our ears;
Night and the dawn, bright day and thoughtful eve,
All time, all bounds, the limitless expanse,
As one vast, mystic instrument, are touched
By an unseen living hand, and conscious chords
Quiver with joy in this great jubilee;
—The dying hear it, and, as sounds of earth
Grow dull and distant, wake their passing souls
To mingle in this heavenly harmony."—

There are few if any better pieces in the volume than those written by the Rev. Dr. Henry Ware. He has written very little poetry and no piece of any length. The following makes us regret that he has not written more. Many a volume of poems contains less poetry:—

SEASONS OF PRAYER.

To prayer, to prayer;—for the morning breaks
And earth, in her Maker's smile awakes
His light is on all below and above,
The light of gladness, and life, and love,
Oh then, on the breath of this early air
Send up the incense of grateful prayer.

To prayer; for the glorious sun is gone
And the gathering darkness of night comes on,
Like a curtain from God's kind hand it flows,
To shade the couch where his children repose.
Then kneel while the watching stars are bright
And give your last thoughts to the guardian of night.

To prayer;—for the day that God has blessed
Comes tranquilly on with its welcome rest
It speaks of creations early bloom;
It speaks of the Prince who burst the tomb.
Then summon the Spirits exalted powers,
And devote to Heaven the hallowed hours.

There are smiles and tears in the mother's eyes,
For her new-born infant beside her lies;
Oh! hour of bliss, when the heart o'erflows
With rapture a mother only knows.
Let it gush forth in words of fervent prayer
Let it swell up to heaven for her precious care.

There are smiles and tears in that gathering band,
Where the heart is pledged with the trembling hand.

What trying thoughts in her bosom swell,
As the bride bids parents and home farewell!
Kneel down by the side of the tearful fair,
And strengthen the perilous hour with prayer.

Kneel down by the dying sinner's side
And pray for his soul through Him who died.
Large drops of anguish are thick on his brow;
Oh! what is earth and its pleasures now!
And what shall assuage his dark despair
But the penitent cry of humble prayer?

Kneel down at the couch of departing faith,
And hear the last words the believer saith.
He has bidden adieu to his earthly friends;
There is peace in his eye that upward bends;
There is peace in his calm, confiding air
For his last thoughts are God's, his last words prayer.

The voice of prayer at the sable bier
A voice to sustain, to sooth, and to cheer.
It commends the Spirit to God who gave;
It lifts the thoughts from the cold dark grave;
It points to the glory where He shall reign
Who whispered—"thy brother shall rise again."

The voice of prayer in the world of bliss
But gladder, purer than rose from this.
The ransomed shout to their glorious King
Where no sorrow shades the soul as they sing;
But a sinless and joyous song they raise,
And their voice of prayer is eternal praise.

Awake, awake, and gird up thy strength
To join that holy band at length.
To Him who encreasing love displays,
Whom the powers of nature unceasingly praise,
To Him thy heart and thy hours be given,
For a life of prayer is the life of heaven.

The name of William Cullen Bryant is well known in Europe. He seems, like one of our own great poets, to have "lisped in numbers." He wrote in his thirteenth, and published in his fourteenth, year, two poems called the "Embargo" and the "Spanish Revolution." In the collection before us there are so many extracts from the poetry of his maturer years that we have difficulty in selecting an extract. We should like to give his "Forest Hymn," but it is too long. We therefore take a subject that comes home to our business and bosom at the season of the present writing, when the ice is all melted and old Fah. is approaching a century of degrees:—

TO THE EVENING WIND.

Spirit that breathest through my lattice, thou
  That cool'st the twilight of the sultry day!
Gratefully flows thy freshness round my brow:
  Thou hast been out upon the deep at play,
Riding all day the wild blue waves till now,
  Roughening their crests, and scattering high their spray,
And swelling the white sail, I welcome thee
  To the scorched land, thou wanderer of the sea.

Nor I alone—a thousand bosoms round
  Inhale thee in the fulness of delight,

And languid forms rise up, and pulses bound
  Livelier, at coming of the wind of night:
And languishing to hear thy welcome sound
  Lies the vast inland, stretched beyond the sight.
Go forth into the gathering shade; Go forth
  God's blessing breathed upon the fainting earth!

Go, rock the little wood-bird in his nest,
  Curl the still waters, bright with stars, and rouse
The wide, old wood, from his majestic rest
  Summoning from the innumerable boughs,
The strange deep harmonies that haunt his breast:
  Pleasant shall be thy way, where meekly bows
The shutting flower, and darkling waters pass,
And where the o'ershadowing branches sweep the grass.

Stoop o'er the place of graves, and softly sway
  The sighing herbage by the gleaming stone;
That they who near the church-yard willows stray
  And listen in the deepening gloom, alone,
May think of gentle souls that passed away
  Like thy pure breath, into the vast unknown.
Sent forth from heaven among the sons of men,
And gone into the boundless heaven again.

The faint old man shall lean his silver head
  To feel thee; thou shalt kiss the child asleep,
And dry the moistened curls that overspread
  His temples, while his breathing grows more deep;
And they who stand about the sick man's bed,
  Shall joy to listen to thy distant sweep,
And softly part his curtains to allow
Thy visit, grateful to his burning brow.

Go—but the circle of eternal change
  Which is the life of nature, shall restore
With sound and scents from all thy mighty range
  Thee to thy birth-place of the deep once more;
Sweet odours in the sea-air, sweet and strange
  Shall tell the home-sick mariner of the shore;
And, listening to thy murmur, he shall deem
  He hears the rustling leaf and running stream.

We shall mention but two more writers, and of these the one shall be a Bishop and the other a Lady.

The Right Rev. George W. Doane is a poet; although from the time that his college days were ended he has not had much time to spare from the more direct duties of his sacred calling. As classical subjects are rare in American poetry, we shall give a few spirited lines on the brave Spartans who fell at Thermopylæ, in preference to another extract that we had marked:—

THERMOPYLÆ.

'Twas an hour of fearful issues
  When the bold three hundred stood
For their love of holy freedom
  By that old Thessalian flood
When, lifting high each sword of flame,
They called on every sacred name,
And swore, beside those dancing waves,
They never, never would be slaves.

And Oh! that oath was nobly kept;
From morn to setting sun
Did desperation urge the fight
Which valour had begun;
Till, torrent-like, the stream of blood
Run down and mingled with the flood;
And all, from mountain-cliff to wave,
Was Freedom's, Valour's, Glory's grave.*

Oh yes, that oath was nobly kept,
Which nobly had been sworn:
And proudly did each gallant heart
The foeman's fetters spurn;
And firmly was the fight maintained,
And amply was the triumph gained;
They fought, fair Liberty for thee;
They fell,—TO DIE IS TO BE FREE.—

Mrs. Lydia H. Sigourney is the woman next to Mrs. Felicia Hemans' We have seen better pieces from her pen in English newspapers and magazines than any that the volume before us contains. We suppose these are so universally known that the Editor did not think it necessary to reprint them. Many of them are doubtless well known to our readers, as perhaps, to some of them, are the following lines on

CONTENTMENT.

Think'st thou the steed that restless roves
O'er rocks and mountains, fields and groves,
With wild, unbridled bound,
Finds fresher pasture than the bee
On thymy bank or vernal tree
Intent to store her industry
Within her waxen round?

Think'st thou the fountain forced to turn
Through marble vase or sculptured urn
Affords a sweeter draught
Than that, which, in its native sphere
Perennial, undisturbed and clear
Flows, the lone traveller's thirst to cheer
And wake his grateful thought?

Think'st thou the man whose mansions hold
The worlding's pomp and miser's gold,
Obtains a richer prize
Than he, who, in his cot at rest,
Finds heavenly peace, a willing guest,
And bears the promise in his breast
Of treasure in the skies?

One thing strikes us in looking over this book of the Poets and Poetry of America, and that is, the inordinate proportion of lines that have appeared in some provincial newspapers or magazines, and which, had we found them there, we should have called very pretty, and forgotten. Now these are to us very important, as shewing the genius and tendency of the national poetic spirit. Many of them shew that there is such a spirit, but the vast multitude of them shew that it is not in circumstances favorable to its developement. In fact, they indicate

* The imitation of Byron in these two lines is *rather* too close.—ED. *I. Rev.*

that poetry receives but the shreds and remnants of the time and attention of those who can in some measure appreciate it, that it is but adopted as a relief from the tedium of a ten miles railroad journey, performed at the rate of forty miles an hour: that, indeed, poetry is rather a task performed according to empiric rules than a labor of love, the outgoing of a spirit that will not be restrained, the forthputting of a power that cannot remain inert. Let us hope that even these essays in versification will not be without their use in calling forth latent alent, and discovering the existence in some one of a power that might otherwise lie dormant till the sunny days of youth had passed away, and the cares of the world had smothered the fire of genius.

It seems to us very clear that a great poet, in the sense in which Milton is a great poet, could not have been reasonably expected to have arisen in America hitherto. The circumstances in which America was placed at the period of the revolution, were such as to absorb the entire national spirit in the solution of the problem, to make America a country, and a great country, in the shortest possible space of time. This has now to a certain extent been achieved. America occupies a high place among the nations of the Earth. She is at least in such a position that she ought to look much higher, and we trust the time has now come when the foundation of a national literature will in good earnest be laid. And if this time be come, we can predict that the structure that shall be reared will be excellent and fair just in proportion as its architects shall be enabled to shake off their national vanity, and shall be contented to drop their national idiosyncracies. In this let them take a lesson from the sculptor in his art, who does not attempt to perpetuate in stone the varying fashions of the present day, knowing well, that independently of their essential ridiculousness, they would, in a few years, become intolerable from the change of taste and fashion, but adopts, instead, the infinitely more graceful and now unalterable costume of ancient Greece and Rome. Now America is still but in her youth. Her national tastes and peculiarities of feeling are in a transition state, and the writer who shall attempt to perpetuate these tastes and feelings in their present state will at once lend his aid, such as it may be, to the retardation of the progress of mind, and will ensure for himself that his works will ere long become antiquated and forgotten. In these circumstances it is most fortunate for America that her language is that of an old people, not to say such a people. We say not a word as to the political separation that has taken place between Great Britain and America, nor hazard any opinion as to whether America would now have been in a better or worse state had she continued till this day as a colony of Great Britain than she is now under her own republican government. But of this we are sure that her literary greatness will very much depend upon her close union with Britain, as fellow citizens of the Republic of letters. We know multitudes of American writers would not like to be told this, but the more judicious of them would agree with us. There is not among all the American literati a more sagacious man than Washington Irving, and he has found the necessity of assimilating himself as closely as possible to the character of an English writer. He has done wisely; and the more his countrymen follow his example, the better will it be for their national literature.

SELECTIONS FROM BRITISH AND OTHER PERIODICALS.

THE GREAT BLAST AT ROUND DOWN CLIFF NEAR DOVER.

Whatever degree of merit may be accorded to the Engineering labours of former times, and we do not think lightly of them, there is one feature in which we think they must yield the palm in favour of modern practice. To the boldness and originality which marked many of the undertakings of a former age the increased and extended lights of science have enabled the engineer of modern times to enlist on his side some of the mightiest powers of nature, and to direct their tremendous energies to the developement and completion of his designs with a degree of safety, certainty and precision almost beyond belief. The stupendous operations now carrying on in the construction of the south eastern Railway, may serve, in no small degree, to illustrate the truth of our remarks, and it is with much pleasure that we lay before our readers the following particulars of an event, in connection with the work, which may fairly challenge competition with any of a similar character in the records of mechanical science, and entitles its author to the highest triumph of engineering calculation and skill.

We have availed ourselves of the representations contained in that very surprising and entertaining periodical, the "Illustrated London News," the copies from which, though on a reduced scale, will enable the readers of the 'Review' to form a tolerably clear idea of the scene of action. Our description is gleaned from the same source.

That our readers may be enabled to understand more freely the vastness of the undertaking it may be well to state a few particulars of the work which gave rise to the occurrence which more especially claims their attention.

At Folkstone, between Cheriton Downs, and East Wear Bay, the valley is to be traversed by a viaduct of great height and length. This is to be succeeded by a tunnel, called, from a martello tower near it, the Tower Tunnel, one third of a mile in length. Then follows, in a line parallel with the base of the main-land hills, as they approach the sea, a deep cutting through the chalk and superincumbent strata, two miles in length, called, after a neighbouring eminence, Warrens's Cutting. Then comes the Abbot's Cliff Tunnel, one mile and a quarter in length. From the Abbot's Cliff Tunnel the railroad will be under the cliffs, close to the sea and protected from it by a strong wall of solid masonry two miles long, and with a parapet of such a height as will not preclude passengers from the splendid marine view which lies under them. This sea-wall will support the railway to the point at which it enters the Shakespere Tunnel. But it was found, that its direct course was stopped by the projection of the Round Down Cliff, and that this must in some way or other be removed. To tunnel it was impracticable; to dig it down would have cost £10,000, and an expenditure of twelve months' time. It was resolved by a single blast to take it out of the way—the resolution has been successfully effected, and its ruins are at present spread smoothly on "the unnumbered idle pebbles" of the shore, to form, by a fortunate accident, the platform of a grand Channel Pier for the Company.

Round Down, rising 375 feet above the level of the sea, is the central and highest point of the celebrated range of chalk cliffs which run from Folkstone to Dover. On the west, towards Folkstone, the line is terminated by Abbot's Cliff, and on the east, adjoining Dover, by the well known Shakespere's Cliff—

> · whose high and bending head
> Looks fearfully in the confined deep,

From which,

> The fishermen that walk upon the beach
> Appear like mice, ...
> The murmuring surge,
> That on the unnumbered idle pebbles chafes
> Cannot be heard so high: ....

These hills are separated from the main heights by a shallow valley, through which winds the bye-road to Folkstone. Ascending from the vale they slope upwards by gentle curves to their escarpment, which presents a majestic front to the ocean of about five miles in extent, and an average height of 350 feet. This front is nearly perpendicular; but varied here and there by bold projections, which divide the beach at their feet into corresponding spaces.

On the morning of the 26th of January, Mr. William Cubett, the engineer, with whom originated the stupendous project, and by whom it has been so completely and so successfully carried into effect, accompanied by the directors and a numerous company of visitors, amongst whom were noticed Sir John Herschell, Professors Sedgwick, Barlow, Gregory and Airy, the Astronomer royal, Rev. Dr. Cope, Principal of Addiscombe, General Pasley, Col. Rice Jones, Mr. Rice. M. P., Lady Herschell and Son, Mrs. Airy, and, it is said, several fair members of the Radnor, Filmer and Knatchbull families, proceeded to view the Shakespeare Tunnel in which a blue light was fired to make the unique peculiarities of its situation and arrangements visible. This noble *souterraine* is rather more than three-quarters of a mile in length, divided throughout, in the manner of the Thames Tunnel, by a pier 10 feet thick, each tunnel 12 feet wide and 30 feet high. This duplication of structure [*See Fig.* 1 *Plate* 13,] together with the parabolic form of its arches, adds immensely to its strength. They are ventilated by seven shafts, which pass upwards to the surface of the cliff, their average height being 190 feet, the highest 207 feet, and by eight galleries, which run from the southern tunnel to the sea, the longest about 600 feet in length. Through these galleries the chalk was conveyed during the progress of excavation. The whole of the south tunnel is faced with brick, and most of the northern, except where, from the extreme hardness of the chalk, it was considered unnecessary. Our engraving of the Shakespere Cliff exhibits the line of towers on the top of the ventilating shafts, and the section of the tunnel, with the relative proportions of its parts. The company, in their progress through the tunnel were greatly delighted by the magical effects produced by the reflected lights thrown from an efflorescence of nitrate of lime whose crystals everywhere bedecked the walls.

On emerging from the tunnel, the huge rampart formed by the projecting cliff of the Round Down was seen at about two hundred feet in advance, bestriding the beach, and opposing an impassable obstacle to the passage of the railway in that direction. The company were then conducted to its base, and the arrangements for its destruction by the dreaded blast explained. These we shall now describe. A small arched drift-way, or tunnel, 300 feet in length, running from east to west, was pierced through the bottom of the Cliff; from this, at nearly equal distances, three well like shafts were sunk, and from these again proceeded three horizontal galleries. At the end of each gallery a chamber was prepared, with a box for the gunpowder. The centre box contained 75 barrels, and the eastern and western 55 each, making in the whole the unparalleled charge of 185 barrels, or 18,500 lbs. The gunpowder was placed in upright bags, the mouths open, and powder sprinkled very thickly between them. Two bursting charges were placed in each box, by which ignition in two places in each charge was produced at the same instant, and the simultaneous action of the whole charge very much facilitated. These charges were placed 70 feet from each other, the centre one (the point of greatest resistance) 90 feet, and the lateral ones 70 feet from the face of the cliff. The apparently dangerous work of packing the powder and inserting the firing-wires in the bursting charges was completed in three hours, by Mr. Hodges, the assistant engineer, and Corporal Rae, of her Majesty's Sappers and miners. The chambers and contents were then carefully examined and approved by General Pasley and Lieutenant Hutchinson, and the galleries and shaft closed up with tightly rammed chalk and sand. The chalk to be scattered by this latent power was calculated at about

500,000 tons; but the quantity actually removed has proved to be upwards of 1,000,000 tons.

The directors and their visitors, having had these points fully explained, together with some very interesting narratives of various preliminary experiments, took a last circuit round the base of the cliff, and proceeded by a zigzag stair, cut in an adjoining cliff to the downs at top, and thence to the battery, to inspect the apparatus for generating and conducting the galvantic "fire" to the charges. On the slope of the cliff a wooden shed [*See Fig.* 2. *Plate* 13] was constructed, in which was placed a triple set of immense compound batteries, each one consisting of three sets of Daniel's batteries of six cylinders each, and two plate batteries, of twenty plates each. [*See Fig.* 3]. From each of these batteries a wire was conducted over the cliff to a powder chamber, where it terminated in a bifurcated point of platina, which the galvanic fluid, as it passed over them, heated to an intense white heat, to ignite the powder. These wires were composed and formed of stout copper placed round a rope, to which they were firmly attached by a coil of spun yarn, and the whole again wound round and covered by well-tarred yarn. These wires were about 2200 feet in length. Five large charcoal fires, to dissipate damp, completed the arrangements.

Curiosity was now at its height; admiration—in which, if Burke on the Sublime be true, *fear* is an essential ingredient—thrilled in every nerve; speculations of the wildest, funniest, and most fearful character, struggled with each other for common audience. "What," said Professor Sedgwick, "what, if there should be a concealed fissure, a blinded chasm in the cliff beneath us; A smart vibration *might* throw it open!" "What then?" cried a ghastly querist. "We shall be swallowed up," groaned one. "Swallowed *down*!" sighed another. But still—still the fascination of the cliff and its eighteen thousand five hundred pounds of gunpowder was irresistible; and, though many fidgetted to be gone, no one budged an inch. At this time three steamers, gaily dressed with flags, passed the fated field, fired a few popgun salutes, and prudently retired to an anchorage a mile off.

To prevent, as far as human precaution could prevent, the possibility of accident, a certain portion of the summit of Round Down Cliff was marked out by striped red and white flags, and the police and the privates of the Artillery (of whom a company was present) were empowered to let no person intrude within the line so marked out. The following bill was also conspicuously placarded in all parts of Dover, and in the roads and streets leading to the cliff:—

BLAST AT THE ROUND DOWN CLIFF.—CAUTION.

Persons are particularly cautioned and requested to keep on the outside of the ground marked off by the range of flags; a nearer approach to the blast being considered dangerous. The cliff under which the powder is placed will be distinguished by a red flag, which will be taken down five minutes before the blast takes place.

January 26, 1843. JOHN WRIGHT, *Resident Engineer.*

At nine o'clock a red flag was hoisted directly over the spot selected for the explosion. The wires were then tested by the galvanometer, the batteries charged, and every arrangement completed for firing them.

It was arranged that the explosion should take place at two o'clock, and, in order that the public might be prepared for it, the following account of the signals to be used was very generally circulated on the ground:—

SIGNALS. *January* 26, 1843.

1st. Fifteen minutes before firing, all the signal flags will be hoisted.—2nd. Five minutes before firing, one gun will be fired, and all the flags will be hauled down.—3rd. One minute before firing, two guns will be fired, and all the flags except that on the point which is to be blasted, will be hoisted again.

Two o'clock came, and all persons were ordered to leave the battery-house, except Lieut. Hutchinson, who undertook to fire the centre battery; Mr. John Wright, the resident engineer, and Mr. Hodges, the assistant engineer, who respectively took the western and eastern batteries. The general interest now became painfully intense—a dead silence prevailed.

"The choughs and crows that wing the midway air" were heard to chatter with a horrid distinctness. At ten minutes past two Mr. Cubitt ordered the

the signal-flag at the directors pavilion, to be hoisted, and that was followed by the hoisting of all the rest. The air was still, the sea was calm, the murmuring surges gently laved the cliff's huge foot. Was this fair scene to be the prelude to disaster? A quarter of an hour passed in waking dreams—a year-long minute succeeded, when a shell with a lighted fusee was thrown over the cliff, from which it bounded to the beach, and burst with an astounding report, followed by echoes from the hills, which had the effect of sharp fusilades of musketry. All the flags were then hauled down. Four minutes more passed away; two guns were fired, and all the flags except that on the point to be blasted were again hoisted. The "one minute before firing" was reached: it passed in exquisite courage-screwing tumult. "Now! now!" shouted the eager multitude, and at precisely 26 minutes past two o'clock a dull, muffled, booming sound was heard, accompanied for a moment by a heavy jolting movement of the earth which caused the knees to smite. The mines were fired! In an instant the bottom of the cliff appeared to dissolve, and to form by its melting elements a hurried seaborne stream. The superincumbent mass, to the extent of 500 feet, was then observed to separate from the mainland, and as the dissolution of its base was accomplished, to sink, by gradual subsidence, to the beach. In two minutes its descent and dispersion were accomplished. The huge volleys of ejected chalk, as they swelled the lava-like stream, seemed to roll inwards upon themselves, crushing their intergral blocks, and then to return to the surface in smaller and coalescing forms. The mass seemed to ferment—to be spiltting, whirling, fleeing, under the influence of an unseen but uncontrollable power. There was no roaring explosion, no bursting out of fire, and what is very remarkable, not a single wreath of smoke, for a mighty agent had done its work under an amount of pressure which almost matched its energies: the pent-up fires were held in their intensity till all smoke was consumed, and when their "dogs of war" were actually let loose they were even then compelled to "do their spiriting gently." A million tons of weight and a million tons of cohesion held the reins.

When the turf at the top of cliff had been launched to the level of the beach, the stream of *débris* had extended a distance of 1200 feet and covered a surface of more than fifteen acres! The moment the headlong course of the chalk had ceased and the fruition of every one's hopes accomplished, a simultaneous cry was raised of "Three cheers for the engineer!" William Cubitt was then honoured with as hearty a huzza as ever burst from the lips of a grateful people. An epoch in our history had passed; a precedent had been established whose effects on future time no one could forebode; it had been demonstrated that the most powerful, the most mysterious agency in nature was under computable regulations and the easiest control. The people felt this, and in their generosity called for "one cheer more." These congratulations penetrated the gloom of the battery-house and dissipated the fears of the operators, for we have it on their own authority, "so slight was the noise or the shock that the impression on their minds was, the fire had failed, until the cheer of the spectators undeceived them, their situation preventing them from witnessing the result."

DESCRIPTION OF THE PLATE.

Plate 12. Fig. 1. Round Down Cliff, viewed from the Director's Pavilion (a portion of the Shakspeare visible in the middle distance.)

„ Fig. 2. Round Down Cliff from the beach, shewing the powder Tunnel and firing lines.

„ Fig. 3. Shakspeare Cliff. In the foreground the summit of the Round Down. In the distance the South Foreland.

„ Fig. 4. Destruction of the Round Down Cliff as it appeared when falling.

Plate 13. Fig. 1. Cross section of the Shakspeare Tunnel. Scale 15 feet to half an inch.

„ Fig. 2. Summit of the Round Down Cliff showing the Battery House, caution Flags, line of Company's property and the Pavillion.

„ Fig. 3. Plane of the Batteries.

„ Fig. 4. *a*. Section of Round Down Cliff, *b*. Drift way, and chamber where the powder was placed. *c*. Battery house. *d*. Line of required face. *e*. Face formed by the blast. Scale 200 feet to half an inch.

Fig. 5. *a*. Drift way, *b*. Shaft. *c*. Gallery. *d*. Powder chamber. *e*. Box of Powder bags. *fff*. Wire from batteries. Scale 10 feet to half an inch.

A few weeks subsequent to this memorable explosion, on the 2nd March, Mr. Cubitt was again successful in dislodging another portion of the same Cliff, by which he secured a safe and commodious passage beneath for the line of the Companys Railway. Comparatively this was a minor effort, but a comparative one only,—the quantity of powder used on this occasion being 7000lb and the effect was the removal of 50,000 yards of chalk from the crown of the Cliff.

DESCRIPTION OF AN INSTRUMENT FOR REVERSING THE COPY OF A DRAWING ON STONE OR METAL, INVENTED BY PROFESSOR WALLACE.

Reverting to the letter of "An Amateur Lithographer" in our February Number, we have now the pleasure of redeeming the promise made on our part by placing before him the plan and description of an instrument invented for the express purpose to which he has called our attention.

It is proper to state that the instrument, so far as our enquiries have extended, has never yet attracted the attention of any professional instrument maker for the purpose of sale,—and we are therefore somewhat doubtful of our correspondent being able to obtain one ready for use, and equally doubtful of the propriety of "passing" the order for the manufacture of such an instrument on his own responsibility,—simply because it would be made precisely according to the plan and specification he might furnish, but without any regard to such modification of its construction as experience alone could point out where and in what degree necessary.

The simplicity of the plan will enable our correspondent to superintend the "getting up" of the instrument on a very economical scale; nearly the whole of the parts can be made of wood at an expense we think of not more than 2 or 3 rupees; and when he shall have satisfied himself that the instrument will do its duty, it will then be time enough to obtain one of a more workmanlike shape and costlier material.

The following description of the instrument is extracted from a very excellent work published by Professor Wallace entitled "Geometrical Theorems and Analytical Formulae, with their application to the solution of certain Geodetical Problems"—Ed. Ind. Rev.

[Fig. 1. Plate 11.] Represents the model of the Reversing instrument, projected orthographically on the plane of the table on which it stands; and figure 2, is a verticle section of the model: its base G g is a rectangular board of mahogany, fourteen inches by ten, and half an inch in thickness. F and f are two cocks [or bridges,] of brass, shaped like the letter Z. The body of the letter representing H h (Fig. 2) the part of the cock or bridge that is perpendicular to the base, their tails (the lower cross part of the Z) are fixed to the base by screws, shewn in fig. 1. Between each cock and the base there are two wheels, these are, the upper and lower base wheels, their planes are parallel to the base; they have a common axis, which is fixed in the lowermost, and on this the upper revolves; the lower end of either axis turns in a socket in the base, the upper passes through H h, the upper branch or head of the cock at F and f. In this way the axis of the wheels are supported vertically on the base. The lower wheel has a single groove on its outer edge to receive a band; and the upper two grooves to receive two bands.

On the upper surfaces B b of the lower wheels, there are arms D d fixed by screws (these, are shewn in the vertical-cross section). Each of these is analogous to the half of the human arm next the shoulder (the brachia). These wheels are connected by a band, K, Fig. 1. which crosses itself between them, so as to form a resemblance of the figure 8. When one wheel, with its axis, is turned about, the action of the band turns the other wheel in the contrary direction, and thus the two

arms turn with equal angular motions, about the extremity in contrary directions.

At the other extremity of either arm and above it, there is another wheel, C c. This turns on an axis which is perpendicular to the arm ; on this wheel there is fixed a radius E e, which turns with the wheel. This member of the instrument is analogous to the portion of the human arm between the elbow joint and the wrist, and the wheel c to the elbow joint, it may be called the joint wheel.

All the six wheels are the same size, and the grooves on their edges alike deep. A band passes round the joint wheel and the lower groove in the upper base wheel, without crossing ; thus connected, these wheels turn together. A band passes also round the upper grooves of the upper base wheels, and crosses itself between them ; the wheels thus connected, turn together but in contrary ways. By these four bands all parts of the instrument are connected, so that if the extremity of a radius, farthest from the joint wheel on which it is fixed, be kept at rest, and the bands do not slide in the grooves, all parts of the instrument will be immoveable. If, again, one arm of the instrument be held fixed, and the joint wheel at its extremity be returned with the radius which is fixed on it, then the other joint wheel and its radius will turn round with the same angular velocity, but in a contrary direction ; both the arms will, however, continue at rest.

If again, either arm, and the lower base wheel on which it is fixed, be turned round, the other arm and wheel will also turn, with an equal angular velocity, but in a contrary direction ; the angles by the radii and the arm will, however, remain unchanged.

On the whole, by the equal angular motions of the arms, and the radii on their centres, in contrary directions, the points of the radii farthest from the joint wheels have a motion compounded of two circular motions ; and by these they move symmetrically, like a man's hands in the act of swimming : so that, a tracer being fixed at the extremity of one radius, and a copying pencil at the extremity of the other, if the former be carried over the lines of any design, the latter will make an exact copy of it, but in a reversed position.

Some further contrivance will be necessary to make an enlarged or diminished and reversed copy of a design ; but by making the reversing instrument supplementary to the common Eidograph, every thing to be wished for can be accomplished. The two may be united, and may work together in the way I have practised, [as explained (page 146) of "Geometrical Theorems"] in using two Eidographs to accomplish a great reduction in the copy. The tracing point of a reversing instrument may be united, by a joint, to a copying-arm of the Eidograph, or the contrary, and in either way a reduced and reversed copy will be made at once.

In this way any subject may be transferred, by a single operation, mechanically, to a lithographic stone, or by a steel point, to a copper plate covered with an etching-gronnd, and the plate prepared for being corroded by the acid.

The reversal of the copy is effected by the crossing bands, which pass round the lower base-wheels ; if the bands pass round the wheels without crossing, the copy will not be reversed, but will be similar to the original.

It is evident that the wheels fixed on the base of the instrument may be at any distance from one another ; and, indeed, they may be in different apartments of a house. In this case, the connecting band might, without crossing, have its direction changed by a suitable contrivance, and might pass through a wall, or under a floor, so that a correspondence might be carried on secretly between persons considerably remote, and separated by supposed obstacles to intercommunication.

The model here figured and described is not intended to shew the instrument as it shall be made, when composed of metal. Its form will, of course, receive several modifications ; in particular, the cocks which support the axis of the base-wheels may be dispensed with, and the axis fixed vertically in a heavy metalic base. The object of this description is, not to exhibit a perfect instrument, but merely to explain a principle by which an instrument may be constructed, which, being combined with the common Eidograph, may render essential service in transferring a design from paper to metal plates or to stone.

In the figure which represents the instrument, the arms are placed symmetrically on the rectangular base, but they may have any direction ; it is only necessary that the angles made at the centres of the joint-wheels by the arms and radii shall always be equal, and increase or decrease together.

Constructed as the model is, the arms and joint wheels if made of metal would be liable to swag. This may be prevented by extending the axis of the base-wheels upwards, and making them turn in tubes firmly screwed to the upper base-wheels. The same may be done at the joint-wheels. On the whole there seems to be no difficulty in the application of the principle here explained, which the ingenuity of a common workman will not readily overcome in the actual construction of an instrument.

THE "YANKEE GEOLOGIST."

The extraordinary fame of the Machine known under the above singular title, and the interest excited by its results amongst Engineers and Mechanics, have prompted us to present in our present number a representation of it, such as it appears in Mr. Weale's "*Examples of Railway Making.*"

The Machine, the product of American ingenuity and skill, presents a somewhat complicated appearance, but is in action and effect both simple and efficient. The power is obtained from a Steam Engine erected on a car or platform of great strength and solidity, moveable on iron rails temporarily adjusted to the place in which the machine is to work.

The excavator, as will be seen on reference to the Figure [*Plate* 11] is nothing more than a huge iron spade or shovel, attached by chains working over pullies at the end or head of the jib of a substantially built crane, by means of which, and two inflexible iron bars or propellers, jointed to the back and sides of the excavator by an iron stirrup piece, the excavator is forced in any required direction—the line of its motion being determined and modified conjointly by the descent of the crane and the diagonal motion of the iron bars or propellers just named.

Those who have ever seen the common dredging machines used on the Thames and other rivers for clearing away gravel and mud will experience no difficulty in comprehending the modus of its action.

The surprise with which its operations is invariably witnessed, arises from the perfect ease and celerity with which its several motions are performed, and the irresistable power with which it appears to be invested as shewn in the ponderous results of its labours.

The idea of such a machine is by no means a novelty in mechanics: the great labour and expenditure both of money and time in making extensive excavations would naturally enough suggest the advantage of employing more efficient means than mere human labour presents, and we accordingly find that many ingenious men have bestowed their time and their capital with various degrees of success in attempts to introduce such a machine as the "*Yankee Geologist.*" The great difficulty appears to have been that of arranging any system of machinery which should efficiently imitate the various powers and appliances in the hand of man: his picks, cutters, scoops, and scrapers. The most successful of those who have devoted their time and means, to this subject, we mean of course previous to the invention of the *Geologist*, was Mr. G. V. Palmer of Worcester, who in 1830 patented a machine "*to cut and excavate earth*;" a second patent for a similar purpose was taken out by the same gentleman in 1832. The first of these machines was worked by steam power, the second, we believe, was intended to be worked either by steam or horses: an account of both may be found in "*the Engineers and Mechanics Encyclopedia,*" a very useful work of reference, by Luke Hebert. As we have remarked the great difficulty that required to be overcome was that of adapting the machine to the various demands on its powers in excavations of any extent presenting various strata, and to which the hand labourer could at once apply an instrument suited to the nature and character of the soil, and the obstructions to be removed. This great difficulty the "*Yankee Geologist*" has, it is said, fairly surmounted, winning for its inventor posthumous fame, and for itself if we may credit the assurances of its transatlantic admirers, no less a title than "*the benefactor of its species*": nor does the prosopopeia rest here; with true Grecian taste and boldness, "He" (the Geologist) it is said "walks right into a mountain, as though it were a plate of hot cakes, and dips up a cart load at a shovelful as fast as you please. He cuts right and left a path some six rods wide through the hill, and then takes a new swath. If he comes to a stone weighing only a ton or such a matter, the "*Geologist* makes no bones of it, but pitches it into the cart like a peck of gravel; if he comes

to a stone weighing some 4 or 5 tons he takes him up more carefully and lays him out on the other side of his path" .

consisting of clay, sand, coarse gravel boulders of various sizes, some of them closely bedded together, and many of them requiring blasts to cause their displacement, were excavated in forty six days."

The Machine, when complete is said to be worth 6000 dollars; it is secured throughout Europe by patent, the valae of which is stated at about one million of dollars.—*Ed. I. R.*

NASMYTH'S PATENT DIRECT ACTION STEAM-HAMMER.

Mr. James Nasmyth, of the Bridgewater Foundry, Patercroft, having long noticed the defects of the old forge hammer, has directed his attention to the subject, and has produced a hammer for forging the larger description of articles of wrought-iron, which will, there can be no doubt, come into very general use. One universal feature in all the old tilt-hammers is, that the power that makes them rise and fall consists of *rotary* motion, originating in the *rectilinear* motion of the piston of the steam-engine, conveyed to the hammer through the medium of revolving shafts, and finally reconverted into its original *up and down* motion by means of a cam-wheel; the bringing the power, by a round about course, to the form in which it originally existed, is productive of many disadvantages—the great friction and loss of power being the principle; to resist the destructive effect of the vibratory motions of the hammer, weighing, perhaps, six or eight tons, the foundations have to be made so solid, as, in some cases, to cost nearly as much as all the engineering part of the work besides. Another great defect is, that the larger the mass of metal to be hammered the slighter will be the blows, while a thin plate receives them harder than necessary, and the old tilt-hammer, working on a fulcrum at one end, the face of it and the anvil are not parallel, except for one thickness of work. With a view to relieve all these defects, Mr. Nasmyth contrived the "Direct Action Steam-hammer," of which the engraving [*Fig.* 6. *Plate* 13] will convey an explanation. It consists of a cylinder, C, the pistonrod of which comes out at the bottom, instead, as in most other cases, at the top; this cylinder is supported over the anvil, K, by two upright standards, O, O, the end of the piston-rod being attached to a block, or mass, of cast-iron, B, guided in its descent by guides, or ribs, cast on the edge of each standard; this mass of iron is the hammer, while the cylinder, with its piston and rod, supplies, in the most simple, yet direct and effectual manner, the power by which the massive hammer is raised. In order to set this steam-hammer in action, steam of such pressure must be used as will a little more than balance the weight of the block B; this steam is admitted under the piston by the pipe, P, into the valve-box, and the valve being opened by the attendant, the steam is admitted to press upon the underside of the piston, and up goes the hammer to any height required within the capacity of the length of the cylinder. The handle, E, is then moved the contrary way—the steam is cut off—that which has been used escapes by the pipe L, and the block falls, by its own momentum, upon the work on the anvil. Energetic and powerful as is the stoke, any variety in the intensity of the blow may be secured, from the gentle tap to the most ponderous smash; and, by the action of the valve, the hammer may be arrested at any part of its downward stroke, and held for any length of time. The application of this hammer may be made available to every description of forge work—to hammering and swaging rods, bars, and plates of every description, and pans, copper, or iron, of every size and shape; and when it is considered that, perhaps, nine-tenths of the defects which are met with in boiler plates, arise from the imperfect manner of shingling the block-iron from which they are rolled, and that here we have a power competent to force out all the scoriæ and form a perfectly solid mass. It is apparent that, if this invention does not effect quite a revolution in the art of forging, it is at least a most important addition to the arts, and must introduce many advantageous changes in the manufacture of every description of iron.

Mining Journal.

THAMES TUNNEL, HISTORICAL NOTICE.

March 25th.—The opening of this interesting work to foot passengers took place this day, and as it has now reached completion for all the purposes for which it was intended, with the exception of the land approaches to the carriage-roads, which can be accomplished without fear of accident, a history of its progress from the commencement may not be unacceptable to our readers. Several attempts had been made to carry a tunnel under the Thames previous to the proposal of Mr. (now Sir Isambard) Brunel about the year 1822, but they were only driftways, or mere drains, compared with this, and we believe there is at Gravesend still part of one in existence, a considerable way under the river, though the entrance s closed. All these attempts, however, failed, and it was left to the matured ideas, and engineering skill, of Sir Isambard Brunel, to establish the principle that a thoroughfare for carriages and foot passengers is practicable under deep and tidal rivers, and without interruption to the navigation of such rivers, and to establish for himself an everlasting monument beneath the waters of the Thames, to carry his name and talents to posterity, holding him up as a credit to his native country—France, to England, his adopted one, and a benefactor to engineering science. In 1824, the shares were liberally subscribed for, and in 1825 the work commenced, by the erection of an enormous brick cylinder, forty-two feet high, fifty feet in diameter, and three feet thick, at the distance of 150 feet from the wharf; the excavation for the perpendicular shaft was then proceeded with, the cylinder being gradually sunk till it reached the necessary depth, the horizontal excavation, or tunnel, was then commenced, and proceeded with until the year 1828. On the 14th of January in this year, a second irruption of the river took place in front of the shield, which completely inundated the tunnel with mud, seriously injured the shield; and, the capital of the company having become exhausted, the undertaking now appeared surrounded with irretrievable difficulties, if not involved in certain ruin. Still the greatest interest was excited, and numerous were the speculations as to the probability of its completion, nine-tenths of those who professed to know anything about it, giving it up for lost. A public meeting was held, at which H. R. H. the Duke of Cambridge and the Duke of Wellington attended, and resolutions were carried in favour of raising fresh capital by loans, on debentures, but nothing effectual was done, and the works remained untouched until 1835, a period of seven years. In this year, under the sanction of an Act of Parliament, the Lords of the Treasury allowed the Exchequer Loan Commissioners to advance out of the money voted for public works the amount estimated as necessary to complete the tunnel. The mind of the engineer had, however, not been idle during this period, and on being thus provided with the sinews of war, he, in 1836, after a cessation of eight years, once more boldly attacked the enemy, armed with a new shield of sufficient power not only to withstand any serious influx of water from the quicksands, but any hydraulic pressure, which, under the circumstances, it could be subjected to—it was a master piece of ingenuity, and executed, in the best manner by Messrs. Rennie. Having sunk in the Thames, over the orifice, an immense quantity of soil, and taken every precaution for the safety of the men, he succeeded to admiration in clearing out the mud, &c., removing the old, and fixing the new shield, which answered the most sanguine expectations of the engineer. During the further period of eight years, he has had numerous difficulties to contend with, inseparable from the work, and, against which it was impossible to be prepared, and among these, on three occasions, was the complete swamping of the work from irruption through the silty soil. Satisfied, however, of his capability for the ultimate completion of his darling object, he never despaired, never flinched, he viewed temporary defeats as but teaching him to conquer, and by indomitable courage, after sixteen years of hard, mental, and bodily labour, he has succeeded and produced a work *beneath the waters of the earth*, which shall vie with that unmatched specimen of Telford's genius, which proudly floats in mid air, over the Straits of Menai. Perhaps no public work ever caused so much interest and speculation as to its accomplishment, as the Thames Tunnel, and among foreigners of all nations, amazement was particularly created, at the bare idea of a roadway under the Thames. In this country of mines, the mere idea of a tunnel would create no surprise, had the soil been solid chalk or clay, but here the strata were of the very worst kind, great part of the ground was formed of sedimentary deposits and the shield was often driven through

silt and quicksand, which were force, through the smallest apertures, and at such times the iron over head, little more than an inch in thickness, was the only division between the tunnel and the Thames. The work, however, is now complete, and we sincerely hope that the new communication thus opened between the Surrey and Kent, and the Middlesex and Essex shores, will become sufficiently attractive to pay the shareholders for the patience with which they have awaited the result. The total cost of the tunnel and foot passenger's descents, has been £446,000, or only about one-fifth of London-bridge and its approaches. The excavation made for the tunnel was 38ft. broad, and 22 ft. 6 in. high, presenting a sectional area of 850 ft.; the interior horizontal diameter of each arch is 13 ft. 9 in., and 15 ft. 4 in. vertical; depth at the shaft on the Rotherhithe side 63 ft., and declining towards the centre of the river 2 ft. 3 in. per 100 ft.; the base in the deepest part being 76 ft. below high water mark; the length is 1200 ft.

Mining Journal.

IRON MASON OR STONE-CUTTING MACHINE.

A trial has recently taken place in Mr. Neilson's quarry, Kelvin-street, North Woodside, Glasgow, of a very powerful machine for cutting and dressing stone. This Machine has been erected many months, but the experiments hitherto have been to ascertain the best forms of tools, the method of setting them, and the rates of velocity both of the cutting parts of the apparatus, and the advancement of the stone; many of the blocks, however, employed in the erection of the new county buildings, were hewn by it. It is driven by a powerful steam-engine, and though capable of working the largest stones quarried, yet smaller ones can be dressed with the greatest nicety. The kind of stone subjected for this trial was the Kenmuir rock, which is perhaps the hardest of the freestones employed in the buildings in Glasgow. The stones pass through the machine on a long train of carriages, each carriage having one stone fixed into it, the cutting is performed by revolving wheels with tools fastened in them, they enter one end of the machine rough as they leave the pick of the quarryman, and come out at the other end hewn and polished on the surface, and cut straight and square down the sides; eight of the stones dressed on Friday were ordinary ashler, and contained forty feet of surface work, and thirty feet of side hewing, and were completed in twenty minutes, being equal to the work of 120 men, but as this machine will turn out work containing two and a half times the extent of this surface, it is thus capable of doing the work of 300 men, and should it be brought into extensive use, will completely revolutionise the trade, great part of the heavy expense of masonry being in the first hewing. The greatest difficulty anticipated, was the preserving the corners and edges unbroken, this difficulty, however, has been completely got rid of, by giving the plane in which the points of the tools revolve, a slight inclination where they first strike the stone, and they then pass off without again touching the edges. Many of the most eminent builders and architects have, at various times, witnessed the experiments with much satisfaction. The patent is the joint property of Mr. William Neilson, Messrs. David Lyon, and Co., and Messrs. P. and W. M'Onie, engineers, by whom the present one was made. The cost of a machine, with suitable engine, will vary according to size from 400*l.* to 600*l.*—*Min. Journ.*

ILEX PARAGUAYENSIS.

At the February Meeting of the Chemical Society,—Prof. Graham in the chair, two interesting communications were read: the first from Dr. Balfour announcing the discovery of the principle *Theine* in Paraguay Tea, the leaves of the *Ilex Paraguayensis*, as observed by Dr. Stenhouse. The infusion of these leaves forms the beverage of a large portion of the inhabitants of South America. The plant is found to contain the same active azotized principle as the tea of China, which chemical analysis has also found in coffee. Mankind has, therefore. adopted the seeds and leaves of plants, belonging to different orders, and having no natural relation, for a common purpose, which agree in containing the same remarkable substance. The characteristic constituent of chocolate, theo bromine, is also known to be closely allied, in its composition and properties, to theine.—*Min. Journ.*

SUGAR FROM INDIAN CORN.

The second communication was from Prof. Croft, of Toronto, 'On the manufacture of Sugar from the stalks of Indian Corn' (*Zea mais*). This is a new branch of agricultural industry, which is exciting considerable interest in the United States. By plucking off the ears

of corn from the stalks, as they begin to form, the saccharine matter is greatly increased, and the juice comes to contain three times more sugar than that of the maple, and equals, or exceeds, the juice of the ordinary sugar-cane, as raised in the United States. By experiments it appears, that one acre of maize yields 1000 pounds of sugar. The corp has also the advantage that it comes to maturity in from seventy to ninety days, while the sugar-cane requires eighteen months, and is precarious.—*Athenæum.*

PREVENTION OF SPONTANEOUS COMBUSTION.

A letter has been received at Lloyd's containing suggestions from Dr. William Bland on the subject of spontaneous combustion of wool in ships. The whole is too voluminous for insertion, but the principle is the manufacture of carbonic aid gas on board when required, which, by its specific gravity, would subside among the wool, displacing the atmostpheric air. He states that 400 lbs. of carbonate of lime, as whitening, chalk, or the poorer marbles, yield about 180 lbs. of this gas, which would fill a space of 20,000 cubic feet, or 500 tons by measurement. The mode of application, he advises, is to place a cask in every hold, perforated two-thirds the height with a hole an inch diameter, and lined with lead to that height. Into the head of each cask a metallic tube is to be placed, leading from the deck, and protected by a wood casing; each cask to be provided with the necessary quantity of the carbonate, and when required for use, pour down a requisite quantity of sulphuric acid, diluted with four or five times its weight of water, when the carbonic acid gas would disperse to every part of the hold.—*Min. Journal.*

EXTRAORDINARY DISCOVERY.

At the conclusion of a lecture on galvanic electricity, at the Polytechnic Hall, Falmouth, Mr. Robert Hunt (the secretary) announced the discovery, by himself, of a metallic plate, which would receive, by mere contact, impressions of any printed page, an engraving, or the like. This discovery was arrived at by following out the recent discoveries of Moeser, that bodies were constantly making impressions upon each other in absolute darkness, by the agency, as he considered, of latent light, but which Mr. Hunt thinks he has certain proof of being latent heat. The impression received on the metal is at first invisible, but it is readily brought out by the means of any vapour. Mr. Hunt exhibited some specimens of wood and copper-plate engravings, copied from the paper into the metal. These copies exhibited every line of the original, and were far more distinct than any of the early daguerreotypes. Mr. Hunt proposes to call this new art "thermography."—*Mining Journal.*

ON THE EVOLUTION OF OXYGEN FROM THE ORGANIC DEPOSIT OF A SALT SPRING.

At the bottom of the salt basins of salt works of Rodenberg, in Hessia, a glutinous mass is formed, of a greyish yellow colour, and of a tough, skinny appearance, not unlike semi-decomposed animal membrane. Even after being washed, it preserves an odour of fish or sea water. This substance is every where filled with large bubbles of air, sometimes of several inches in breadth, which are so tightly enclosed in the substance that they cannot escape therefrom of themselves, but ascend to the surface in great number, as soon as the skinny substance is torn by means of a stick. The quantity of air thus enclosed is so considerable, that hundreds of bottles might be filled with it. If a burning chip be brought into this air, it inflames, and burns with a bright flame. The air consists of 51 per cent. of oxygen gas, and 49 per cent. of azote. Wohler is of opinion, that at first pure oxygen is evolved, which, however, like air in an animal bladder, is partly exchanged for atmospheric air. It must be observed, that the salt water, when recently pumped out, contains such a quantity of sulphuretted hydrogen, that it might be taken for sulphuretted water: having, however, once passed through the thorn-walls, or filters, into the salt basins, it entirely loses its odour. It was ascertained, by microscopic observation, that the membranous mass consist of living and moving infusoria—species of Navicula and Galionella being interwoven with extremely delicate and colourless threads of confervæ. Since, according to the supposition of Ehrenberg, Priestleyan green matter is not a vegetable substance, but consists of real animalculæ, especially Chlamidomonas *Pulvisculus*, and Englenæ *viridis*, which likewise exhale 60 per cent. of oxygen, the evolution of the before mentioned gas cannot be ascribed to the confervæ existing in the mass, but rather to the infusoria, and to these latter alone.—F. Wohler: *Poggendorf's Annalen.*

BOTTLE PAPERS AND A BOTTLE CHART.

Under this title a curious paper appears in the Nautical Magazine of this month. We confess that after examining the chart, it appears to us that the results are so contradictory that they prove nothing respecting currents. The course of the bottles cross each other in every direction, and though the vast majority of those bottles thrown over in northern latitudes are found on the coasts of France, England, and Ireland, and those of southern latitudes on the shores of one or other of the West India Islands, the fact only proves that a record of such discoveries is more likely to be made in those localities than on the opposite coasts of Newfoundland, Labrador, or Africa. However, the subject is new and curious, and we shall quote what is said by the Editor, as well as some remarkable examples of the length of time that elapsed between launching the bottle and its discovery :—" We have occasionally laid before our readers, as they have come to hand, the particulars of papers found in bottles, sent adrift on the ocean, for the purpose of determining the direction and strength of currents. The device is one belonging to modern times, the earliest proposal of it we have met with being about the year 1801, and the date of the earliest bottles found being 1809. We shall not stop now to discuss the utility of these messengers, which would naturally involve the considerations of direction of the wind and sea, and the time they might lie unheeded on the strand to which they have been carried, but we are content to lay them before our readers with a chart to show their relative courses. Although we have levied contributions from every source within our reach, and would wish to have registered the track of every bottle found, there are no doubt many still that have evaded us. The columns of the table speak for themselves, but by way of brevity we have registered the latitudes and longitudes where the bottles were thrown into the sea in degrees and tenths."

Ships.	Where Left. When		Lat. N.	Lon. W.	Where Found. Coast.	When.		Interval. Yrs.	Dys.
			°	°					
Cashlton Park	27 July	1827	48.6	10.3	France	21 Dec.	1837	10	146
Emerald	17 Dec.	31	36.7	12.5	Anegada	8 Jan.	33	1	22
Lady Louisa	2 Feb.	30	45.0	13.7	France	14 Oct.	39	9	254
Symmetry	9 June,	25	*Mad*	*eira*	Turks I.	9 June,	35	10	
Flora	29 July,	40	43.9	18.6	Cuba	1 April,	42	1	246
Kate	27 June,	25	24.0	19.0	Cuba	28 Nov.	26	1	154
Fanny	16 Feb.	12	30.0	23.0	Penzance	4 March,	13	1	25
Thunder	24 July,	33	28.4	25.5	Bahamas	12 Dec.	34	1	141
C. Dunmore	8 Mar.	28	27.4	28.0	Bahamas	19 May,	29	1	72
Two Brothers	21 Nov.	26	17.0	26.0	Crooked I.	8 Dec.	27	1	17
Wellington	10 April,	36	15.3	27.4	NW Azores	21 March,	40	3	346
Isabella	2 April,	35	23.3	37.8	Tortola	13 Sept.	36	1	164
J. Cropper	10 Jan.	24	48.3	38.1	Mount's B.	12 Feb.	25	1	33
Blonde	23 Sept.	26	43.5	38.5	France	15 June,	42	15	285
Three Sisters	20 July,	24	41.0	42.0	Mount's B.	12 Oct.	25	1	86
Opossum	2 June,	39	27.2	42.0	Bahamas	22 May,	42	2	354
Albion	20 Oct.	36	41.3	43.9	Hebrides	7 Nov.	38	2	18
Blonde	28 Sept.	26	43.5	38.5	France	16 June,	41	14	261
Hecla	16 June,	19	58.2	46.9	Teneriffe	29 July,	21	2	43
Egardn Castle	7 July,	25	45.7	47.0	Andros I.	10 May,	29	3	297
Sarah	29 May,	25	49.0	48.2	Somerset	14 April,	36	10	321
Alexander	27 May,	18	59.1	52.3	Staffa	28 July,	19	1	62
Alexander	29 May,	18	62.0	54.0	Donegal	19 July.	19	1	21
J. Esdaile	28 July,	21	36.9	71.8	Lancashire	5 Dec.	22	1	130
Lark	29 Nov.	38	25.5	79.3	Madeira	2 Oct.	40	3	308
Lark	28 Jan.	38	20.7	85.6	Galveston	26 May,	39	1	115

Athenæum.

THE AERIAL STEAM CARRIAGE.

With a view to the gratification of our readers we are induced—*favoured*—by the protracted issue of our present number, and the opportune arrival of our London papers, to extract a brief notice of that all absorbing object of scientific interest and regard the Aërial Steam Carriage.

Public attention was first called to the startling project by a notice which appeared in a number of "The Atlas" in the latter part of last year. The announcement, as may be readily conceived, was calculated to excite in the general mind little more than a feeling of idle curiosity and wonderment, and with little promise of any thing beyond the mere gratification of that feeling, whilst amongst persons of more sober thought and reflection it was received as one of those absurd schemes by which the gullible nature of our countrymen has, not unfrequently, been successfully played on —— or at best the day dream of some young aspirant for scientific honours and distinction—

"With unfledged thoughts soaring to fall"

and as such scarce worthy of serious enquiry or regard.

As the attention of the Indian public was in a particular manner more especially appealed to, and "bright hopes and visions fair" held out that this new and extraordinary mode of transit would be almost primarily devoted to the advancement of their interests and welfare, the marvelous statement attracted the notice of a Gentleman previously connected with Indian affairs as a member of the respectable firm of Dodwell and Miles, East Indian Army Agents. In a letter addressed to the Editor of the "*Atlas*" Mr. Miles stated, that, prompted by a desire to satisfy himself as to the correctness of the representions made in that Journal, he had taken considerable pains to arrive at the truth, and thus states the result of his enquiry :—

"It is perfectly true that such an invention is in existence, totally distinct from the principle of balloons ; that a working model has been shown me, which, by its action, appears to establish the perfect practicability of travelling through the air, being so complete and simple in its construction, and the combination of its parts so extraordinary, that little doubt remains that the important results of the invention will be fully achieved."

The testimony thus voluntarily furnished by so respectable and so competent a witness gave the project a new and a strengthened claim to public favour, and it has since continued to hold a prominent place in the consideration of men of scientific and practical knowledge.

The desire to gratify the curiosity of the public, amongst whom Rumour with her thousand tongues had raised many vague and puzzling conjectures on the mysterious nature of this (to quote a London authority) "*enchanted machine*" has induced the Editor of the "Atlas," and the Editors of other London Journals, to throw together such items of information as they could obtain on the general principles and construction of the great novelty in question :—these, with a like laudable desire, together with the pictorial illustrations by which they are accompanied, we proceed to lay before the readers of the 'Review.' We do not affect to be wise beyond what is written, and have, therefore, little to say against the description of this singular and interesting invention, so far as it goes, unless that it does not go far enough to remove the doubts and difficulties which arise from a consideration of the subject. We are, on the one hand, disinclined to sneer at the scheme

as an absurdity, being, though not quite so old as Methuselah, quite old enough to remember many things which by the wise in their generation were pronounced *impracticable—impossible*, and therefore *absurd*, but have nevertheless been brought to bear, proving merely that their projectors and inventors were a degree farther advanced in the knowledge of the particular matter than their opponents. On the other hand, without any breach of good feeling or good manners towards so meritorious a labourer in mechanical science, as the inventor evidently appears to be, we may be allowed to express our sincere hope that *he* at least has fairly seen, considered, and provided for all the difficulties and dangers by which his undertaking is beset, although they have, in a great measure, been overlooked or disregarded in all the statements which have at this time reached us.

The pictorial representations are of a highly unsatisfactory character; they present no tangible idea, if we may so express ourselves, either of the carriage itself or of the mode and means of propulsion. The mere rapid revolution of vanes, as they are drawn in the sketch [*See Plate* 15] would scarcely, we apprehend, serve to maintain an onward motion, or, indeed, any motion at all. With such propellers as are there represented we think the propelling power, being in one medium, would be balanced at every moment and in every direction by equal resistances, somewhat in the same manner as in the submerged paddle-wheel experiment made some years ago in the Thames. Contrary to the expectations of its inventors, the revolution of the paddle wheel imparted no motion to the vessel until the falling of the tide brought the paddle in contact with a bank of mud. The moment this took place the Vessel was propelled until arrested by the paddle becoming immovably fixed in the too friendly medium.

We shall watch the progress of this singular undertaking with interest, and shall not fail to furnish all the information which may come to hand,—in the mean time heartily wishing complete success to the "*Aërial*," and honour and profit to its very talented inventor.

(Extracted from the 'Atlas'.)

"Our readers will perceive by a description of the machine, whatever chances of failure there may be attending its first essay in its adopted element, that it is the first illustration of a new principle in mechanics, though a very old one in nature.

The account we subjoin is from the pen of a scientific and intelligent writer, wholly uninterested in the future results of the undertaking, save as a scientific man watching a new era in the scientific world, and it will be seen his opinion pronounces it not only likely to succeed, but to produce benefits to society of an almost unbounded nature. For the responsibility of these opinions we hold ourselves aloof, since it is scarcely our province to offer remarks on the statement or the hypothesis of the engineer; and we have purposely consigned the task of narrative to a man of science that it may not be said the interests of the journalist, to authenticate his former assertion, induces him to exaggerate the excellencies or gloss over the imperfections he describes.

Merit is not always to be meted by results; and if in the first, second, or third attempt, the doctrine of atmospheric pressure on plain surfaces be not exactly exemplied. experience will perfect what a correct principle has commenced. Thus to Mr. Henson is due the praise which most deservedly awaits the inventor, who for a long period of years has diligently sought to carry out a well-conceived idea, throughout the intricacies of details, the laughter of friends, and the rackings and harassings of thought. To the co-partners, also, many thanks are due for originally detecting the correct principle, and thus aiding its development, even in a crude and embryo state.

The English press, as our readers may imagine, teems with discussions on the results, this machine is likely to produce, and as each month will bring forth something new respecting it, we shall not fail to give all the interesting details a place in our next Indian edition.

In fulfilment of the promise we made a fortnight ago, we now lay before our readers an account of Mr. Henson's extraordinary invention. Mechanical affairs are commonly repulsive to all who are not accustomed to them ; we think it due, however, to this most important enterprize, and not less so to our readers, to strip the subject of technicalities as much as possible, and to render the principles and construction of the machine as intelligible as we can. Happily, its details admit of pretty accurate comparison with well-known objects, and its *ensemble* is of very easy comprehension.

Let our readers, then, first imagine a floor, or platform, 150 feet long by 30 feet wide. We are somewhat puzzled for a word which will accurately designate this main part of the machine. We have called it a floor or platform, merely because of his large area ; and yet those terms are improper, except we divest them of all peculiar meaning of weight or stabillty, for this expanded surface floating through the air really performs the office of wings, though it has none of their vibratory motion—it has no joints ; it is remarkably strong and stiff from end to end, yet of extraordinary lightness. It advances through and upon the air with one of its long sides foremost, that side being also a little raised. A tail of 50 feet long, and of similar construction, is jointed to the middle of its hinder edge ; and under the tail is a rudder. Across its middle is a vertical web which answers the same purpose as the keel of a vessel, or more nearly of the fin on the back of some fishes—viz., it checks oscillation. All these different parts of the machine are constructed with an especial view to the combination of strength with lightness, and are covered with silk or linen.

To the main expanse or wings which we have described, and immediately beneath it, are suspended the car and a small, light, and very ingenious and powerful steam-engine ; the latter actuates two sets of vanes or propellers, like wind-mill sails, and of 20 feet diameter, situated at the back edge of the wings.

The principal feature of the invention, as far as the description has yet proceeded, is the very great expanse of its sustaining planes, which are larger in proportion to the weight to be carried than those of many birds ; but if they had been still greater, they would not have sufficed of themselves to sustain their own weight, to say nothing of their machinery and cargo—surely, though slowly, they would have come to the ground. We have remarked, however, that the machine advances with its front edge a little raised ; the effect of which is to present its under surface to the air over which it is passing, the resistance of which, acting on it like a strong wind on the sails of a windmill, prevents the descent of the machine and its burden. The sustaining of the whole, therefore, depends on the speed at which it is travelling through the air, and the angle at which its under surface impinges on the air in its front ; and this is exactly the principle by which birds are upheld in their flight with but slight motion of their wings, and often with none.

But, then, this result, after the start, depends entirely on keeping up the speed, and there remains beyond that the still more formidable difficulty of first obtaining that speed. All former attempts of this kind have failed because no engine existed which was at once light enough and powerful enough to lift even its own weight through the air with the necessary rapidity. Mr. Henson has removed this difficulty, partly by inventing a steam-engine of extreme lightness and efficiency, and partly by another and very singular device which requires particular notice. It is perhaps necessary to add, that any device by which the requisite velocity can be obtained may be used instead of the inclined plane, as, for instance, a stationary steam-engine with a level road.

All former inventors had supposed it necessary to carry in the machine itself all the power necessary to commence and sustain its flight. Hence some failed in their attempts, and others were deterred from making any attempt at all. Nor does machanical art, even in its present advanced state, afford the means of overcoming the difficulty, so long as this view of the subject is adhered to. Nature and art, however, combine to show us that this difficulty may be surmounted : Mr. Henson, following their indications, employs this expedient. *His machine, fully prepared for flight, is started from the top of an inclined plane, in descending which it attains the velocity necessary to sustain it in its further progress.* That velocity would be gradually destroyed by the resistance of the air to the forward flight ; it is, therefore, the office of the steam-engine and the vanes it actuates simply to repair the loss of velocity ; it is made, therefore, only of the power and weight necessary for that small effect. Here, we apprehend, is the chief, but not the only, merit and originality of Mr. Henson's invention ; and

to this happy thought we shall probably be indebted for the first successful attempt to traverse at will another domain of nature.

It would be easy to show that this principle, though disguised in appearance, really obtains in all mechanical action, and that the power which puts a machine in motion must be considered distinct from that which keeps up that motion. We shall, however, only refer to the familiar instance of the clock, which is *set* going by drawing its pendulum to one side; it is *kept* going by the weight or spring preventing the decay of its motion. So Mr. Henson sets his machine in motion by its decent down the inclined plane, and keeps it so by his steam-engine.

Just so does a large bird often start from a high tree or rock. First, he makes a swoop downwards to acquire velocity; that gained, it requires little effort to rise again and increase his speed. The violent efforts made by slow and heavy birds when rising from the ground, and the easy flight of the same birds after they have obtained sufficient velocity, show the operation and importance of the same principle. Indeed, the whole is but a necessary consequence of the established mechanical axiom, that a body once in motion will ever continue to move if hindering forces be taken out of the way or balanced. Mr. Henson having started his machine, balances the hindering forces by the action of his steam-engine.

Eventually, then, we come to the question, Is his steam-engine sufficient? And this question, resolves itself into two others—viz., what is the power of his engine? and how much has it to do? The first question is the easier to answer. Its power depends chiefly on the quantity of steam its boiler will produce; judging of it by comparison with the boilers of locomotive engines, it is estimated at about twenty-horse power. Both the boiler and condenser are of very novel and ingenious construction. The former is composed of fifty inverted truncated cones of copper, which are arranged over and around the fire: they are large enough to contain about 100 square feet of evaporating surface, of which half is exposed to radiating heat. The condenser consists of a number of small pipes presented to the stream of air produced by the flight, and is found to answer completely. The steam is worked in two cylinders, and is cut off at one-fourth of the stroke. The weight of the engine, with the 20 gallons of water required to work it, is about 600 lb.

The resistance which is to be encountered, and which, consequently, the steam-engine must overcome, is not so readily estimated. Mechanical science is here singularly defective. Collecting, however, the probabilities which nature furnishes, it seems, on the whole, likely that the power provided will be enough for the purpose. The clearing up of this only remaining doubt will be one of the most important events which has ever occurred in the annals of applied science. Whatever may be the first result of this particular part of the enterprize, we deem the chief difficulties so far removed as to warrant a confident belief that early and complete success awaits the talented inventor, especially as inventions of recent origin are yet in reserve which will, at least, double the power of the steam-engine."

Reference to the Plates.

Plate 14 Fig: 1.—The Aerial in its Flight. Fig. 2, and Plate 15, Construction of Machine.

A, the main frame, or wings, composed of the longitudinal pieces, *a, a, a, a, a, &c.*, and the bow-like individual frames across them.

B, B, B, B, &c., upright posts, or standards, to the upper and lower ends of which metallic braces, shown by the single lines, are attached, supporting various points in the frame.

C, C, a longitudinal piece, which forms the outer boundary of the space required for the vanes, or propellers.

D, D, D, &c., the vanes or propellers, mounted on shafts, as shown in the figure, and drawn by steam-engines by means of bands.

E, E, &c., the tail, turning on a joint at *F*.

G, the car, containing the steam-engine, cargo, conductors, and passengers, in suitable compartments.

H, the rudder.

The covering of the wings and tail is of silk or linen; that of the wings is divided into three lengths for each end joining each other at the double frames

shown: this division facilitates the rapid reefing and spreading of the covering, which is effected by the cords running parallel with the longitudinal pieces, *a, a, a, &c.*, of the wings. The tail and rudder are in like manner governed by cords proceeding from the car.

To the description thus given in the "*Atlas*" we have much pleasure in adding, a letter addressed by Mr. Haltzapffel the celebrated mechanic of Charing Cross, to a Gentleman in India, detailing some particulars in which the description already given from the "*Atlas*" is defective. We are not quite certain as to the effect of Morgan's paddle wheels (mentioned in the letter) in the situation in which they are designed to be used, or how far it would be necessary to modify the opinion we have expressed as to the propellers represented in the picture. We have never had the good fortune to witness Morgan's Paddle wheels in action or otherwise, and have not any immediate source of reference or information on this point.

There is a pleasant air of confidence in the happy result of the undertaking running throughout Mr. Holtzapffel's letter, which, coming from so clever and so practical a man, may well incite confidence and hope in others. We have no wish to see them dashed, and as little to see the "*Aërial*" put to the necessity of calling on the sons of the desert to repair her damaged copper if a trip or two to the south of France can help to prevent it. For so desirable an end we can afford to wait a little longer, praying only that when she does venture to visit the realms of Ind "may we be there to see."

Sir,—My friend and late preceptor Mr. Holtzapffel of Charing Cross and Long Acre, has sent me the following account of the much talked of "Aerial 'buss" which perhaps may be interesting to your readers, and

I am, Sir, your's obediently,

G ——— S. ———

November 1, 1842. 64, *Charing Cross, London.*

My dear Sir,—Not having heard from you since your departure for Ceylon, I conclude there is nothing in our way likely to be required, which is not supplied by the Birmingham manufacturers.

Hoping that you have not abandoned the pursuits my instruction made you so capable of following with credit to both pupil and instructor; I send you an account of the great novelty here, which we, with other engineers, are actively employed upon; hoping it will be instructive to you, and pleasing to your friends, to have the particulars of the construction of this great curiosity, which no doubt you have heard of—I mean the *Aërial* ship.

Her length is equal to twice her breadth, and she is very flat. This great extension of superficies is to diminish her specific gravity as much as possible. The head and stern are of a parabolical figure, as high as the highest part of the engines, so as to open an easy way for her through the air. She is formed of thin copper sheets, similar to the sheathing of ships, on a fame of strong iron wire $\frac{1}{8}$ths inch in diameter flatted; the copper is fixed to the narrow edge of the wire ribs by annealed copper-wire passed through holes in the sheets round the rib, and then the ends of copper-wire twisted together. The sheets are rivetted together sparingly, and the whole is made watertight by tin being run in the joints. The watertightness is to prevent sinking should any accident occasion her descent into water. She is provided with two oars which *may* in such a case be useful—of course an at all rough sea would swamp her directly, on account of her flat construction. The boiler is a tube-boiler on the principle of Gurney's locomotive boiler for turnpike roads. There are two high pressure Engines formed of *wrought* stub iron of the best quality; every cylindrical part hollow. The cylinders are made on the principle of the ribband gun-barrel, which being of excessively strong construction, admits of their being made very thin, and consequently light. They are placed obliquely. The propellers, which resemble bat's wings, are of a beautiful construction and mechanism, which would occupy too much space and require drawings to explain at all intelligibly: suffice it to say, that they are formed of light iron ribs covered with a strong silk web which has

been rendered more tough and elastic by a solution of caoutchouc. One of the advantages of silk over linen or cotton for the wings, besides strength and lightness, is in the case of a spark from the furnace falling on them it will at most only burn a hole a little larger than itself, silk being uninflammable and the caoutchouc not being in sufficient quantity to make it inflammable. The smoke and waste steam are expelled through a funnel in the stern, parallel with the keel, so that they add to the propelling power after the manner of a rocket. The beds of the conductors are between the engines and boiler (rather warm by the bye) and the provision, water, &c. &c. are stowed under the beds. The coal, which is a peculiar preparation containing a large quantity of combustible matter in a very small space, is stowed in the head. Both engines work the same shaft, and therefore both wings are worked by both engines, in the same way as the paddles of a steamer. They found it necessary to give her a fly to equalize the action, and now they are fitting paddles to it on Morgan's principle, which are only to act *above* the engines through an arc of 60 degrees. So it will work its own passage. The fly runs towards the stern. Each engine is capable of disconnection from the other by a lever, in a moment, so as to reverse the motion of one of the wings when she is required to turn. By another lever the motion of the wings may be made vertical when it is required to rise ; horizontal when to descend in an inclined path to any place ; and at an angle of 45 degrees with the earth's surface, when the usual advancing and steady (as to rising or sinking motion) is required. This oblique action is required to overcome gravity. All tension stays requiring stiffness are made of good yellow pine as having a greater power of resisting tension than any other rigid material. Other tension stays requiring flexibility are made of the best hemp, *caoutchoucd*. The bat's wings are enormous as may be supposed, and their action perfect ; their rapid expansion and collapse is beautiful and astonishing.

Some persons who know that man cannot fly with artificial wings, suppose he cannot make a flying ship ; but the reason of the failure of man's flight is that the weight of the body exceeds the power of the arms to work wings of sufficient size to support it. The power of the steam engine, being almost unlimited, it may be used to move wings of far greater size than are necessary to raise itself.

It was originally intended to send her to India for her first voyage ; but I rather think she will take an experimental trip or two to the south of France, for in Europe if any accident happens she may repair but I doubt much whether the Arabs, &c. could even fit a new copper sheet to her properly. She will carry a brilliant light underneath, so that the navigators at night may perceive if they approach too near the earth. And the direct flight, being kept from the men by the bottom of the ship will not dazzle their eyes.

Trusting to hear from you soon.

I remain, my dear Sir, your's truly,

JOHN HOLTZAPFFEL.

PROGRESS OF ELECTRICITY.

In the course of numerous experiments made by Messrs. Wright and Bain, for the improvement of their electric printing telegraph, they have discovered that the circle of a galvanic battery is as effectually completed through a large body of water as an insulated wire. They are now in treaty with the Government to construct a telegraph on this principle between the Admiralty and Portsmouth—one insulated wire to be laid down to connect the battery of the port with the printing apparatus at the Admiralty, and the circuit to be completed by a wire conductor passing down the Thames to the ocean, and thus along the Channel to Portsmouth, and this round about journey would be performed by the electric fluid instantaneously. This discovery will open a new field for operations in electricity, whose powers, as applied to the arts, are evidently yet but little known, although during the last few years so much has been elicited.—*Mining Journal.*

[We are reminded, by the above statement, of the very interesting and successful experiments of Professor O'Shaughnessy at Garden Reach three or four years ago ; can any of our readers inform us why the results have not been applied to any purpose similar with that contemplated or proposed by Messrs. Wright and Bain.] Ed.

METEOROLOGICAL TABLE, KEPT AT DINAPORE, MARC[illegible]

Days.	Moon's Changes.	Self registering Thermometer. Minimum.	Thermometer, in the shade. Sunrise.	9 A. M.	Noon.	3 P. M.	9 P. M.	Daily range of Thermometer.	Difference between wet and dry bulb Thermometer. 9 A. M.	3 P. M.	Winds. A. M.	P. M.	Remarks. Night.	A. M.	P. M.
1	●	60	60	70	75·8	77	68·4	17	8	12	W.	W.N.W.	Dew	Light clouds.	Thunder storm with ra
2		60·2	60·8	65·5	73·6	76	66·8	15·8	3	12	W.N.W.	W.N.W.	None	Clear and fine.	Clear and fine. [at 7 P.
3		56·5	57·5	67·5	,,	78	68·5	21·5	8	15	W.	W.N.W. strong.	Lig't Dew	Ditto.	Ditto.
4		59·5	60·5	70·4	75	77·5	69·5	18	10	12	W.	W.N.W.	None.	Day cloudy.	[rain at 7 P.
5		65	66	71	73·3	75·5	70·8	10·5	8·5	10·5	N.E.	S.	Ditto.	Cloudy. Rain at 10 A.M.	Thunder storm an
6		59.5	60	67·4	72	74·5	65·4	15	5	9·5	S.S.W.	W.N.W.	Ditto.	Cloudy.	Light Clouds.
7		58·8	59·4	69·8	73·7	76·5	66	15·7	7·5	11	W.	W.N.W. strong.	Dew.	Light Clouds.	Ditto.
8		59·3	59·4	72·6	74	78·1	,,	18·3	10	12·5	E.	E. light.	Ditto.	Cloudy.	Ditto.
9	☽	65·2	67·2	71·4	74·5	77·5	72·8	12·3	8	12·5	W.	N.E.	Ditto	Light Clouds.	Ditto.
10		66	67·6	74·8	75·9	79·5	,,	13·5	9	11	W. light.	W. light.	None.	Ditto.	Ditto.
11		70	*70·5	75·8	76·5	78·4	72·4	8·4	8·5	11	W.	W.N.W. light.	Ditto.	Cloudy and dark.	Cloudy and dark.
12		66·4	67	75 5	77·6	80	73·1	13·6	7·5	9	W.N.W.	W.N.W. strong.	Ditto.	Cloudy.	Light Clouds.
13		65·4	,,	74·5	77	79·8	,,	14·4	8	13	W. strong.	W.N.W.	Light Dew.	Clear and fine.	Ditto.
14		62	,,	71·7	77·7	81	71·7	19	9·5	17	W.	W.N.W.	None.	Ditto.	Clear and fine.
15		58·8	,,	69·5	75·5	78	72·8	19·2	9	13	W. light.	W.N.W. light.	Ditto.	Light Clouds.	Dark and Cloudy.
16	○	64·3	,,	74	76·6	78·8	72·9	14·5	9	10	W.N.W.	W.N.W. light.	Ditto.	Cloudy Day.	
17		63·6	64	74	77·5	80	,,	16·4	9	14·5	N.N.W.	N.N.W.	Ditto.	Light Clouds.	Light Clouds.
18		61·5	62	74	77·9	81·1	75·1	19·6	12	15·5	W.	W.N.W. strong.	Light Dew.	Ditto.	Ditto.
19		64·7	64·7	73·9	77·5	78 8	70	14·1	10	13	N.E. airs.	W.	None.	Cloudy.	Cloudy and Dark.
20		62·5	62·5	71·4	76	79	70·4	16·5	6·5	12·5	W. light.	W.N.W. light.	Light Dew.	Light Clouds.	Cloudy. ●
21		62·6	62·6	,,	79·5	81·7	75·7	19·1	7	14·5	S.	W.N.W. strong.	Ditto.	Clear and fine.	Clear and fine.
22		64	,,	77	80·7	82·4	72·3	18·4	11·5	13·5	S.W. light.	N.N.W.	None.	Cloudy.	Cloudy.
23	☾	62·4	62·7	77·4	,,	80·6	75·4	18·2	10	16	W. light.	N.N.W. light.	Ditto.	Ditto.	Ditto.
24		65	67	77	81·1	81·9	76·3	16·9	9	14	W. light.	W.N.W. light.	Ditto.	Ditto.	Ditto Light rain at 2 P.
25		66·4	68·8	78·3	81	82	73·7	15·6	9·5	17	W.N.W. light	W.N.W. strong.	Ditto.	Ditto.	Clouds of Dust.
26		64	65	78	81·3	83	74·5	19	16	23	W.N.W.	N.N.W.	Ditto.	Ditto.	Ditto.
27		61	,,	77	80·8	82·3	76·8	21·3	16	20	W.N.W.	W.N.W. light	Ditto.	Ditto.	Ditto.
28		60·8	60·8	77	81·5	82·7	76·8	21·9	16	20	W.N.W.	W.N.W. light.	Ditto.	Ditto.	Clear and fine.
29		60·6	60·6	77	81	82·4	71·9	21·8	17	23·5	W.N.W.	N.N.W.	Ditto.	Ditto.	Ditto.
30		63·3	64·4	77	81	82·7	74·8	19·4	18	20	W.N.W.	N.N.W.	Ditto.	Ditto.	Ditto.
31	●	62	63·4	77	81	82	77·4	20	16·8	22·5	W.N.W. light	N.N.W. light.	Fog.	Ditto.	Ditto.
Mean		62·6	63·3	72·0	77·4	79·6	72·3	16·9	10.0	14·5					

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Dr

THE

INDIA REVIEW.

APRIL.] —o— [1843.

BIOGRAPHICAL SKETCHES.

Dr. Frederick Corbyn.

(WITH PORTRAIT.)

When the interest and responsibility of this Journal first devolved on its present conductors, amongst the objects to which their earliest contemplated arrangements had reference, and by which it was hoped they should secure not merely the fulfilment and indulgence of their own desires, but the gratification of their friends and patrons, they had in an especial degree resolved to appropriate in the Biographical portion of the 'Review' an honourable niche to their worthy predecessor, Dr. Corbyn, by whose enterprising spirit the work was originated, and by whose unwearied industry and zeal, amidst many important and distracting cares, it had for many years maintained a high place in the periodical literature of India.

With this intention, whilst casting about for such materials as should enable them to enter on their labour of love, with the hope of rendering it at once an acceptable offering on their part, and a faithful, instructive and interesting representation of a good and a worthy man who has "done the state some service," their attention was happily directed to a notice which appeared some years ago in "The Military Gazette and Literary Chronicle," a periodical which, whatever was its fate, if a judgment may be formed by the number referred to, at least *deserved success*. A perusal of the notice in question, the production of a Gentleman of refined taste and judgment, led to the determination of transferring, with its author's permission, the entire article to the pages of the "Review." Its appearance in the present number renders it unnecessary to say that the request was most kindly complied with, nor did the kindness rest there; it has levied a new obligation on the gratitude it had already excited, by the readiness with which the revision of the memoir was undertaken, and such additions made as the lapse of years since it appeared, and circumstances generally, rendered necessary to bring it down to the present period.

Possessing, as the writer does, a thorough and intimate acquaintance both with the character and the career of the Gentleman whose portrait prefaces this number of the 'Review,' we cannot but esteem ourselves fortunate in obtaining in a form so complete, so well and so elegantly arranged, all that our wishes aimed at, or that our readers could desire.

That there are few things requiring nicer discrimination than biographical notices of living characters, is a fact too universally admitted to call for comment; but in preparing to draw up a memoir of one

already very generally known, it is proper that a writer should shew his pretensions to correctness in the delineation. In cases of this nature, many difficulties present themselves;—sentiments generated by friendship are apt to be overloaded with laudatory exaggerations, incompatible with the right which the world possesses to have 'nothing extenuated;' indifference casts a blight on the entire performance; while he who writes only to condemn, alike discredits his narrative, and the motives that have urged him to attempt it. How far this sketch may deserve the praise of impartiality must be left for others to decide;—though presented in the hope of rendering justice, and at the same time escaping from the charge of adulation, it is still with considerable diffidence that this brief detail is offered to the public eye. Thus much may be permitted to the writer—that having been for *many* years intimately acquainted with the subject of his sketch, having served with him in the field, lived with him in the same tent, and participated his society under the same roof, he has not wanted those opportunities of observation which circumstances have happily continued to him up to the present period.

Frederick Corbyn was born at Manchester, in May, 1792, and from early youth destined to his present profession*. Having passed the ordeal of examination, and obtained his degrees in London, he was appointed in 1813 to the Medical Service of the Company on their Bengal Establishment. He arrived in Calcutta in May of the following year, and, of course, entered on the active prosecution of his professional avocations. In the same year, 1814, he joined the troops assembled in the Turaee against the Nepalese, under the command of the late General Marley, and reached the camp shortly after the affair at Burhuewah. In 1815 he was more particularly engaged in a desperate, though unavailing resistance to a large detachment of the Goorka forces, on the surprise of Captain Blackney's post at Sumunpore. The enemy coming down in overwhelming numbers, both surprize and route were complete, while salvation of life became the only consideration of the survivors. This was happily effected, but with the loss of all equipage and establishments. The writer of this sketch may here be pardoned for a passing tribute to the memory of one, who gathering the remains of the defeated party, conducted its retreat with consummate skill, and received the applauses of the Governor General and Commander-in-Chief, for the ability, steadiness, and courage which he thus displayed under circumstances of the most imminent peril, and the pressure of a disaster beyond ordinary magnitude. The officer alluded to was Lieut. Edward Strettell, of the 22d Infantry, who, with Dr. Corbyn, was the only surviving European of that unfortunate day. After events brought the writer, Dr. Corbyn and this officer into direct association; and he has often listened with melancholy interest, to the recital of the action, and the hardships to which the miserable remnant of Captain Blackney's party were subsequently exposed. To resume the narrative—such was the sense entertained of Mr. Corbyn's services and exertions on the occasion, that they elicited a regimental order of which it would be unpardonable to omit the notice here.

"Mr. Assistant Surgeon Corbyn will deliver over medical charge of the left wing of the 2d Battalion 22d Regiment to Mr. Assistant Surgeon Baker and

* Vide note at the end **.

proceed and join the 25th Regiment in conformity with General, Division and Detachment orders. On this occasion Captain Watson feels himself at a loss how to express the high opinion he entertains of the conduct and professional abilities of Mr. Corbyn ; but whilst that officer has entitled himself to the most greatful thanks of the Commanding Officer, he has also obtained the best wishes of both officers and men ; and he will no doubt to the latest period of his existence look back with pride to that time, when by his unwearied attention he excited the admiration of the whole Detachment, and by his skilful exertions effected the cure of every wounded man entrusted to his charge."

Conformably to the above order, Dr. Corbyn joined the 25th regiment and was present in action with that distinguished corps on the heights of Muckwanpore, attending to his professional duties under the hottest fire of the day. Towards the latter end of the year 1818 the troops suffered greatly from that disease known to India as 'the Turaee Fever,' the nature and treatment of which first brought Dr. Corbyn forward as an author : for, in 1818, he published a small tract descriptive of its effects, and the manner in which he had sucessfully counteracted them. In 1817, the 25th being ordered to Cawnpore, Dr. Corbyn proceeded in medical charge of it, but was shortly after superseded by the appointment of a full surgeon. He had again the satisfaction of receiving a testimonial of professional ability, and the official thanks of his commanding officer for his 'uniform assiduity and attention.' In the same year he was employed as medical store keeper to the field force under the orders of the late Major General Sir D. Marshall ; moved with it to the attack of Hatras ; and witnessed the brilliant and decisive operations which placed that powerful fortress in British possession. Hence he marched to join a corps of irregular cavalry commanded by captain H. T. Roberts, but was speedily recalled to the charge of his old regiment (the 25th) and eventually nominated medical store keeper to the centre division of the grand army, under the personal command of the Marquis of Hastings. It was in November of this year that the pestilential epidemic (Cholera) broke out with such terrific violence in his lordship's camp, and spread its ravages over the whole extent of the Company's dominions. In no part of them was its progress more cruelly marked, than in the Head Quarter camp ; but so early had Mr. Corbyn fixed the disease, and so successful was he in the treatment of it, that the noble lord, in his capacity of Commander-in-Chief, issued a general order enjoining attention throughout India to his method of overcoming its attacks. On the breaking up of the centre division—the Mahrattas and Pindarries having been completely tamed into submission—an augmentation was made from the troops composing it, to the division of Sir D. Marshall, which was still actively occupied in taking possession of the countries about Saugor, and along the right bank of the Nerbudda. With this detachment Dr. Corbyn moved under the immediate orders of General J. Watson, and on joining the left division (Marshall's) was appointed to the medical divisional staff. He was present at the fall of Dhamoney, and at the assault and capture of Mundilah : after the taking of this place, the division crossed the Nerbuddah for the purpose of reducing the strong hill fortress of Chouraghurh, which however surrendered on its approach to the force that had already invested it under Brigadier General McMorine. The season was now so far advanced that it became necessary to take up cantonments at Saugor, and the division measured

back its way to that city. At this period considerable excitement was created by the escape of the Ex-Rajah of Nagpore, and detachments were despatched to scour the country in pursuit of the fugitive. In the ensuing year the troops were again moved down to Asseergurh, and subsequently to Gurrakotah, of both which places Dr. Corbyn witnessed the capture. A judgment may be formed of the great exposure endured, from the fact of the Thermometer, in camp before Asser, being 110° under canvas, and 130° in the batteries;—owing to this cause Dr. Corbyn had no less than six different attacks of illness and narrowly escaped with life. When the force returned to Saugor, Dr. Corbyn had the mortification of finding himself superseded by a junior medical officer, and of being directed to do duty with a battalion. So hard was his case considered, that the superintending surgeon attached to the division, addressed government on the subject, and the following reply was given to his representation.

"I have been favored with your letter of the 18th of July last, in which you make favorable mention of the merit and professional intelligence of Mr. Corbyn, that gentleman's zeal is well known and duly appreciated by the Marquis of Hastings, who could not but regret that urgent motives of public expediency rendered necessary the abolition of the situation he lately filled with the Saugor field force."

Consolation, however, was not altogether wanting; for so general was the attachment he had inspired, that the suffrages of his brethren in arms were publicly conveyed to him previously to his quitting the station. He was now removed to Hoosungabad, having been posted to the 21st regiment, and was doomed, with many others, to suffer heavy pecuniary loss on the abolition of that cantonment. Repeated exposure on service, and in a peculiarly unhealthy climate, had however by this time so debilitated his frame, that he was compelled to leave Nagpore in medical charge of an artillery detachment proceeding to the presidency—on reaching which, he was attached, as civil assistant surgeon to the Zillah of Allahabad, where he remained till the year 1826, when pursuant to orders, he joined the 50th and subsequently the 69th regiment, accompanying the latter corps to Arracan—from which place he was again ordered to the 68th at Sandoway, where he continued until ultimately fixed by Lord W. Bentinck as Garrison Surgeon of Fort William. In noticing the vicissitudes and events of Dr. Corbyn's public career, it must not be overlooked that his time has been unceasingly occupied in a variety of measures, connected with his calling as an officer of the Indian army. Thus he will be found in strenuous exertion to correct the abuses which time had introduced into the management of the Orphan Institution. An unhappy difference in opinion having caused him to resign his seat at the Board of Management, he still continued his efforts to bring to light whatever he believed to be foreign to the real welfare of the orphans, and the true interests of the establishment. When the army at large took up the consideration of the points he had unceasingly agitated, he was again returned, by more than one Division of it, as representative, and still holds his position as one of the elected directors. He has yet more recently succeeded Dr. Brett in charge of the central Hospital, and has been universally known, throughout every stage of his official life, for his perfect skill in surgery. Dr. Corbyn is also one of the Governors

of the Free School, has mixed largely in all discussions touching the dissemination of knowledge, has been appointed medical attendant at the Parental Academy, and enjoys a very large circle of professional practice in the metropolis.

Having thus brought his public career to a close, it is necessary to refer to other services which Dr. Corbyn has conferred, in the character of an author and an editor. It has been already stated that his first publication was the small tract on 'the Turaee Fever' in 1818. From that period his pen has been rarely idle, as will be admitted on enumerating the works which have successively been presented by him to the Indian Community. In 1819 he gave a short treatise on Cholera, which was followed up, the next year, by some additional observations on the same disease. His next production was a topographical description of Sandoway:—and here it should be remarked, that he ranks amongst the first, if not the very first, discoverers of the tea-plant, a report on which he submitted, together with other discoveries, to the then Governor General, Lord Amherst, who was pleased to bestow a flattering acknowledgment of his industry, zeal, and research.

"The Governor General has desired me to inform you that he has read with great interest your account of Sandoway, and will transmit it to the presidency as a very useful public record. His Lordship begs you will send a more particular account of the Tea tree which you described as growing close to Sandoway, and of which the natives make use. His Lordship will be glad to learn in what respect it resembles the tea plant of Assam and China."

Indefatigable in his wish to serve the public, Dr. Corbyn next turned his thoughts to a work which issued in 1828—entitled 'the Diseases of Infants in India,' and this was succeeded by his larger work on Cholera in 1830. Four years afterwards he obtained the Editorship of the India Journal of Medical and Physical Science, of which periodical he wrote the first article, when primarily published by Drs. Grant and Pearson. He is likewise the author of Pulpit and Medical Sketches in the Oriental Observer, and in 1836 established an additional periodical at his own press, under the designation of the 'India Review and Journal of Foreign Science and the Arts,' which together with the Medical Journal, he continued to conduct with unabated application down to the end of 1842. In thus briefly referring to the works of Dr. Corbyn, want of space compels the writer to abstain from doing more than quoting a very small portion of the encomiums he has received from many, who must be allowed to be adequate judges of his merits. A selection from one or two of the home criticisms will suffice to shew that the Dr. has largely shared in the applauses bestowed on talent usefully and successfully employed. On his treatment of cholera, Sir Gilbert Blane observes :—

"I have just read in a Calcutta Newspaper sent to me by Lady Hastings the very interesting account of the singular Epidemic so prevalent and alarming in India at that period, and of your very judicious and successful mode of treatment, I have mentioned to Lord Hastings my high opinion of your professional talents as manifested in that paper, and have enclosed to His Lordship this letter for you."

The opinions of various reviews on the India Journal of Medical Science, and the Diseases of Infants are alike encouraging and flattering :—

"We have, we confess, been no less surprised than gratified by the perusal of this journal. We were by no means prepared for so much original matter and so

much clever and spirited writing as it contains. It is extremely creditable to the editors, and speaks well for the zeal and intelligence of our medical brethren, as a body, in our Indian empire, to whom this journal must be invaluable. We are much struck by the novelty and importance of many of the original communications on medical subjects."—*British and Foreign Medical Review.*

"It is likely to be of service to the profession in that quarter, for it stimulates the indifferent to exertion, and affords opportunities to the zealous for distinction. It is conducted by Mr. Corbyn with professional ability and with gentlemanly feeling." *Medico. Chir. Rev.—London.*

"Filled with good original papers and judicious selections. We must part with him for the present, once more taking leave to express our respect for his talents, and our wishes for his continued prosperity."—*London Medical Gazette.'*

"A highly valuable, and meritorious publication. The India Journal is an honour to the country from which it emanates."

"In no part of our dominions has this want of a complete treatise on the circle of diseases been more severely felt than in Hindustan : the young Surgeon, however well primed with sound Chirurgical and pure medical aphorisms of the Schools, has to commence and pursue his professional duties unaided by the experience of his predecessors and without any guide on which he can with confidence rely." "The author had the merit of first labouring to dispel the obscurity in which a certain class of maladies, incidental to our Asiatic dominions, has been involved."—*Lancet.*

Independently of his duties and exertions as an officer of the service, Dr. Corbyn has been engaged in a variety of business of which the aim and end has uniformly been the advantage of society. Shortly after arriving at the Presidency he was appointed a member of the Select Vestry to the present Cathedral. It is well known that the inhabitants of Calcutta, to whom, and not to Government, the Cathedral appertains as an unquestionable property, raised by subscription about 2 lacs of Rupees for the purpose of its construction, conveying their right to Trustees under the designation of a "Select Vestry." These rights were never made over to the State, so that, in effect, its interference with the concerns of the Church, beyond supplying it with Pastors, must at all times be gratuitous. The Supreme Court having committed to the Trustees a considerable amount of funds for the benefit of the poor, the members of the Vestry were chosen from amongst the most respectable members of the community—Marquis Cornwallis being the first chairman. In recent times, the Metropolitan of Bengal claimed power over the collections and establishments of the Cathedral. Notwithstanding the personal respect he otherwise entertained for Dr. Wilson, Dr. Corbyn, in the same free and uncompromising spirit of independence by which he has been ever actuated, hesitated not to expose this encroachment upon vested rights, by shewing how all responsibility was exclusively, and by due appointment, in the hands of the Trustees. Government, however, placed the matter beyond further discussion by reminding the members of the vestry, in a General Order, that their province, as servants of the State, was unqualified obedience to the wishes or mandates of the Bishop in reference to the points at issue. The press, and public were loud in condemnation of this manœuvre, which detracted not a little from the fame of an otherwise highly popular Governor : but to the vestry nothing was left but to put seals upon the documents committed to their charge. It is remarkable that, since the above period, no public elections of successors to the vestry have taken pace. This beyond a doubt, involves a legal consideration of great importance, in as much as it exhibits a striking departure from established rules and customs respecting the conveyance of public Funds.

An immense property, of which the *Free School* is part, belongs to the trust of the vestry, in virtue of which Dr. C. became a Governor of that noble Institution. A number of abuses had crept in from the want, probably, of constant investigation. Unfounded charges were preferred against the victualler and agent. The Governors investigated them, and acquitted him. Much angry discussion followed, and Dr. C. took a very prominent part in defence of the above mentioned functionary. The Bishop, in conjunction with assessors chosen by himself, became arbitrator. His award was, that nothing in evidence appeared to attach dishonest intentions to the Purveyor. It was a triumphant acquittal; but nevertheless the Bishop decided that the interests of the Institution rendered the agent's separation from it indispensable. Dr. C. warmly contended, at public meetings held on the occasion, such a course of proceeding was altogether novel; that the innocent was made the sufferer, to the triumph of the slanderer; forgetting the demands of justice and truth, which it was to be supposed would more obviously subserve the interests of the Institution.

The appointment of a Clergyman followed as chaplain and secretary, which was strongly opposed by Dr. C., as blending secular and clerical vocations, whereby the expenses of the Institution, to the loss of the destitute (for whom it was founded,) were increased from Rupees 2400 per annum to Rupees 6016 *in the matter of salary only.*

On ceasing to be a member of the Vestry, Dr. C. was elected one of the annual Governors by the public, and as their representative, has constantly exposed the extravagance of expenditure and the progressing diminution of subscriptions. At the annual meeting before last, he carried his plan of reform; but the Governors, notwithstanding, have not thought proper to put it into execution.

Dr. C. was the first to intimate, through the medium of his Medical Journal, the peculations which had been put in practice at the Military fund, and the agitation by the press which followed occasioned a reform in that Institution in the matter of Receipts and disbursements, and hence he was the originator of the precautions taken to insure the security of this admirable establishment.

He was also the first to propose the breaking up of the Institution at Kidderpore—of putting all the Orphans on an equality, of abrogating the rule which forbad orphans, born in wedlock, from receiving their annuities in England, and the retention of male orphans on the rolls till the age of 21, instead of, as previously, limiting their age to 14. These propositions have been carried by the army, and are now sanctioned by the Court of Directors.

While he has been thus active in serving the public, it is not to be supposed he would be otherwise than active in serving the government. He has effected great improvements in his official capacity of Garrison Surgeon within the precincts of Fort William. He suggested to the Inspector General a sick-receiving room in the Fort. The importance of this may be conceived where it is stated that the sick had theretofore been sent to an immense distance,—the General Hospital,—exposed to the effects of a burning sun; whereas at present, they are retained and attended to in a well provided Asylum, with the decided advantage of having the promptest possible attendance in cases of sudden sickness.

He next submitted, as a guard against its malarial qualities, the flooding of the ditch during the rainy season, together with other matters of internal medical economy; and to him the permanent residents of Fort William must ascribe their immunity from those fatal diseases that formerly rendered the locality so severely trying to the constitution. He has likewise suggested improvements in the internal economy of regiments quartered in Fort William, by which the great degree of sickness invariably prevailing among the men while the heats of the season last, will, in all probability, be infinitely diminished if not altogether prevented.

It will not be considered irrelevant if we here record the opinion of one who has attained so much experience, that India is far from uncongenial to the constitution of European children. He retained his own and—to a very late period—had them educated in Calcutta, where they advanced high in the studies of the classics, mathematics, and other branches of tuition and then were sent home, preparatory to their going to the university. They landed in England in April [1843].—The Captain of the Ship that conveyed them writes, they are considered "robust, really stout, and as healthy as could be wished"—withal intellectual and manly-minded. What a triumph has this been over false views and prejudices against India! What a comfort to parents, to know that it is not indispensable to undergo a cruel painful separation from their Children for the want of early instruction or the inculcation of elementary principles.

Having thus brought the professional, editorial and other public labours of Dr. Corbyn down to the present time, and given the opinion of professional contemporaries as to the merit of his exertions, the more delicate task yet remains of endeavouring to paint *the man*. If in doing this the hand of friendship shall visibly appear, let it be conceded that, as intimacy alone affords opportunity of forming just observations, so it has also the best title to pronounce on qualities of both head and heart, provided the feelings that go with the illustration are sufficiently subjected to the sobrieties of reason and common sense.

In critically examining the lights and shades that mark the lineaments of a living character, there is always danger, lest praise should run into an excess which defeats its own purpose—or that misrepresentation so should distort the picture, as to make it degenerate into caricature by exaggerated descriptions of whatever appears defective.

This observation applies with tenfold force when a generally just estimate can be formed, from knowledge already possessed, of those stronger outlines by which a subject has become to a certain degree familiar, and therefore more easily recognizable. Perhaps few are so universally known as the man whose moral and intellectual qualifications it is now attempted to describe. If this be detrimental to the delineator in one respect, it is not without a corresponding advantage in another; since it necessarily produces the caution which ought to make a representation correct. At any rate, it enables the public to subscribe to the fidelity of the sketch, or to condemn it, at once and upon just grounds, as failing in the resemblance it affects to depict. It is under this conviction that the endeavour is made.

Enthusiastic and sanguine in no common degree, Dr. Corbyn carries with him, in all that he undertakes to perform, an unabating zeal and a

confidence which go far to realize the expectations he has formed—a singleness and sincerity of purpose which no opposition can subdue—a benevolence of disposition supported by firm principles—an unbending integrity that no sophistry can warp, no difficulty can lessen—a simplicity of manner that might almost be mistaken for childishness by those not thoroughly acquainted with him, but which is only the result of his natural candor and perfect guilelessness—a heart alive to every generous susceptibility, and constantly exercising itself in unostentatious acts of charity and kindness to his fellow-creatures, (more especially to those whose circumstances render his sympathies doubly consoling)—these form the brighter tints of the picture, and present a man so little disguised by art, that judgment is satisfied it rests upon a reality. That Dr. Corbyn is not insensible to applause,—that he is even emulous of it in the path he has chalked out for himself, is indisputable; but that he is equally careless if he misses it, provided his conscience tells him he has acted rightly, may be religiously believed. That his discretion may not sometimes err, or that his policy is not very often questionable,—if mere popularity were the paramount object of his attainment,—is still less to be denied. But he has a ready monitor within, that restrains him from doing any thing until conviction of its propriety warrants the execution. From that moment his heart is in his act; and he no longer looks at obstacles but as they serve to stimulate his exertions and arouse his energies. Few men have more friends; yet fewer less enemies; for whatever opinion may be entertained regarding the *soundness* of his views, little or no difference exists in the estimate of his *motives*. A strenuous reformer, in the most comprehensive sense of the word, his manner is inconsiderate; nor does he sufficiently reflect how his purpose may often be lost from the want of urbanity. This must be imputed as a fault; since men may conscientiously differ in sentiment, without meriting the imputation of impropriety; and society has, in all instances, a right to demand the amenities of polished and courteous communication. Even here, however, Dr. Corbyn is unconscious that he may unwittingly inflict a pang—which intentionally, or for the sake of inflicting, he would never desire to raise in the breast of a human being. Enmity is foreign to his nature; though opposition readily drives him to a warmth of expression which may be mistaken for it.

In private life, Dr. Corbyn's disposition is mild and affectionate. His impulses are liberal and benevolent—He has been a careless, though never an extravagant man; and therefore, is not rich in any other possession than the native independence of his spirit, and those honourable sentiments which pre-eminently distinguish the gentleman. He is patient, indefatigable, and constant to his purpose; he entertains no hostility, because he suspects none; he enjoys a never failing serenity of temper, and a flow of animal spirits which are not easily overcome. Captious and close investigation may discover in him some weaknesses that excite a smile; but malice itself is unable to detect a blemish that impairs the character of the man. This is the honest conviction of one who has known him intimately for the space of twenty years, and during that period has not wanted signal opportunities of forming a deliberate judgment.

It only now remains to consider Dr. Corbyn in the light of an author; and this may be done in a few words. In early life his attention was so entirely devoted to professional studies, he neglected almost all others. He is, consequently, too often a loose, though always a ready writer. He does not aspire to the fame of an eloquent one, though his reasoning and his sentiments, where the occasion calls them forth, are invariably lofty. An ardent lover of science, and a zealous promoter of knowledge, the leisure moments of his life are devoted to the exposition of the one and the diffusion of the other. He is indifferent as to style, which he considers comparatively insignificant when balanced with the higher purpose of rendering himself useful to society;—this without a doubt is the true aim and end of all his exertions—the generous object that he has marked out as the legitimate pursuit of his solicitude and his philanthrophy.

Circumstances of an official character have compelled Dr. Corbyn to relinquish his duties as a Journalist. We can only add that the same zeal continued to distinguish him to the latest moment of retaining the conduct of his two periodicals—works abounding in a vast variety of matter while under his superintendance, but wherein it was not to be expected the contents could be arranged with that order which, we dare say, would have been observable had the time and attention of the author not been liable to constant professional inturruption. Whatever difference of opinion, however, may have existed on this point, or in whatever feeling expressed—this is quite certain, that his bitterest opponents entertain so much of respect and regard for the purity and unpretending kindness of his heart, that no one, personally acquainted with him, can do otherwise than desire that he may long survive to enjoy the consequences of the esteem he has created for himself, and which, it may be safely said, is not more generally entertained, let the circle of friends be how numerous so ever, toward any individual in India.

*** The following is from the Herald's Office:—The name of Corbyn is of great date and such as bears record in our countrys chronology.—We find Elinbin D'Corbin attended the Norman Conqueror into England. Guilliam mentions that Alexander Corbyn had his arm's renewed by *Edward the Fifth* for his great services, and as a mark of distinction added to the family a sword in the base erect PP. Their residence was Suffolk and Staffordshire. It would be difficult to ascertain the reason for deviating from the original manner of spelling the name, whether from caprice or what, but without doubt it is the same family, as the arms are alike, with the exception of the distinguished favour of Edward the Fifth.

The arms are *argent*, on a chief, *or*, three crows *sable*; as a mark of distinction, a sword in base erect *proper*. Crest, on a wreath, two arms in armour, coup'd below the elbow, lozenge ways; in dexter hand a human heart; in the sinister a sword through a serpents head all *proper*.

We find by reference to a curious anecdote in one of the *Examiners* the name of Corbyn recorded in the list of the earliest known jury in England.

HISTORICAL RESEARCHES.

By Lieut.-Col. W. R. Pogson.

(*Continued from page* 149.)

The Descendants of Ham.

Returning from the digression which closed the last article we observe that Cush or Koosh, the son of Ham, peopled Babylonia, Chaldea, and the countries on its west and south-west. The sons of Koosh, excepting Nimrod, who settled in Babylonia, migrated to the south and dwelt in Arabia Felix and Arabia Petræa. In like manner, Mizraim, the brother of Cush, settled in Egypt and his brother Canaan in the region of Palestine.

The sons of Canaan had their portions in Canaan—and from them were descended those nations which afterwards became hostile to the Hebrews and to those descendants of Shem who spread westward towards the Mediterranean sea.

Mizraim gradually entered Arabia, and as his numbers increased, extended his possessions to the south-east of Judea, the Red Sea and Egypt. Mizraim gave his name to Egypt, and Canaan to the land of Canaan. Phut proceeded to Mauritania, and Canaan held the sea coast of Palestine. The four brothers possessed the whole region, from the Jihon in Chaldea, to the Mediterranean sea. It included Arabia Deserta and Petræa, the land of Canaan, and upper and lower Egypt.

Canaan was subdivided into Galilee, Samaria and Judea.—Upper Egypt, named Thebaida, extended to Ethiopia on the south, and lower Egypt to Memphis on the south, and the Mediterranean sea on the north. The rest of the western coast of Africa was possessed by Phut; and no other people dwelt between the regions inhabited by the three brothers and their descendants, who settled contiguous to the land of their progenitor, as also did the rest of the posterity of Noah.

Egypt is said to have received that name from Œgyptus, otherwise called Rameses, the reputed son of Belus, who expelled from that country his elder brother Danaus. He proceeded to that part of Greece now called Morea, and gave the name of Danai to the Argives in the time of Joshua*, 877 years after the flood. By Homer's Odyssee it appears that the Œgyptians were so called during the, Trojan war. Egypt was previously known as Oceana, Aria and Osiriana. Josephus citing Manethon, enumerating the kings of Egypt after the departure of Moses, states, that they occupied 393 years, from which it is conjectured that the Œgyptians assumed that name 330 years after Joshua, and 1000 after the flood. But Josephus, citing Manethon, seems to have boasted erroneously of the Israelites being those Hycsos, whom he calls *pastores*, and claims as his ancestors, and therefore as the forefathers of the Israelites, alleging them to have reigned 511 years; for they had no such dominion nor prolonged residence in Egypt.

* St. Augustine citing Eusebius.

Pomponius Mela and others * affirm that 330 kings reigned in Egypt before Amasis, the contemporary of Cyrus, and that the time of their duration was 13000 years—during which period the stars had four times changed their course, and the sun twice set in the east.

These fictions were affirmed by the Athenians and Arcadians to have been older than Jupiter and the Moon—as in Ovid:—

> Ante Jovem genitum terras habuisse feruntur
> Arcades: lunâ gens prior illa fuit.

> Ere yet the Moon did shine or Jove was bred,
> Th' Arcadians the earth inhabited.

The 13000 years is brought within the range of probability by the lunar years of the Egyptians being supposed to have been lunar months, or the light and dark half of each moon to constitute two of their years. Gerardus Mercator, in his chronology, affirms in support of the antiquity of the Egyptians—that the 16th dynasty, from which Eusebius reckons the Egyptian times, commenced with the flood, and that the first of the other 15 began at, or soon after, the creation. To this conjecture, Pererius replies, that Mercator was therein deceived,—because he assumes the 16th dynasty to have been co-eval with the flood: Eusebius having fixed that dynasty in the time of Abraham, and consequently 292 years after the deluge. Mercator moreover fixes the beginning of the 17th, or the dynasty of shepherds, in the reign of Saltis, their first king, in the year of the world 1846—which Eusebius states to have been anno mundi 2140; for, the 16th dynasty began in the 292nd year after the flood, and continued 190 years, whereas Mercator makes every dynasty to have endured 115 years; but Eusebius reckons many of them at less than 100 years; for the 28th was of 6 years, the 29th of 20, and the 30th of 18 years.

Annius, in his supplement of Manethon, affirms that their 15 dynasties lasted but 162 years, and that the first of them began 131 years after the flood: consequently the 15, which Mercator makes antecedent to the deluge, are placed by Annius after it; but Annius seems to have forgotten his previous assertion that it was in the 131st year that Nimrod came into the valley of Shinaar—also the time expended in the building of Babel—and that before the confusion of tongues, the dispersion of mankind, and consequently the plantation of colonies did not take place, and although he asserts Gomer to have migrated to Italy in the tenth, and Tubal to Spain in the 12th year of the reign of Nimrod, which was twelve years after his arrival in Babylonia, yet he inconsistently makes Egypt a government in the first year of Nimrod's arrival in Shinaar, and consequently before the dispersion and remote settlement of mankind; for "from thence (that is from Babel) did the Lord scatter them upon the face of the earth."

The opinion of Pererius that it was improbable or impossible for Egypt to have been inhabited within one or two hundred years after Adam, is not disproved, but impaired by Eusebius;—for there is reason to believe that not only Egypt, but the greater part of the world, was peopled before the flood. The words of Pererius are—Quomodo enim primos mundi ducentos, vel etiam centum annos Adami proles a-

* Trogus Herodotus, Plato, Diod. Sic, &c.

deo multiplicari potuit, ut ad Œgyptum usque habitandum et complendum propagata sit, &c.

For how could the children of Adam have been so multiplied in the first two hundred, or in the first one hundred years of the world, as to inhabit and fill Egypt? Pererius adds—if we confess this, it must be also admitted, that there were then both the Assyrians and other nations.

The Scriptures being silent on this point, reason and probability are the only sure guides to a satisfactory explication.

There is no reason why we should give a less increase to the sons of Adam than to those of Noah; for the longevity of the former being double, and in a few years, treble that of the latter, is an infallible proof of their strength and power to beget offspring.

The increase of population is implied by Cain, apprehensive of the murder of Abel being avenged by those afterwards born, retiring to the land of Nod, east of Eden, where aided by his descendants, he built a city named after his first born son—Enoch*.

If it be established, according to Berosus, that in the 130 years after the flood, Nimrod came into the valley of Shinaar with a population sufficient to build the city and tower of Babel,—and that the multitude was born during that period, or, according to the Scriptures, in 101 years, as is commonly understood, from the birth of Arphaxad, Selah, Heber and Phaleg, it must be equally probable in the space of 130 years, in the prolific age before the flood, that an equal, or even a greater number of mankind were born, and that in the 1656 years between the creation and the deluge, the habitable world was fully peopled; neither does it accord with the true account of the Babylonian and Assyrian Empire, that the whole of mankind came into Shinaar or Babylonia in the first 100, or 130 years after the deluge, for there is no Scripture to prove that Noah came out of the east; while the three millions, composing the Army of Semiramis,—who was but the third from Nimrod, and the immense host of Starobates, by whom she was opposed and overthrown in India, prove, that if the world was so soon peopled after the flood, there is no reason to doubt that it must have been more so before that event, in the ratio of the time elapsed from the creation; for by the account of Mercator and Pererius, Ninus governed Babylonia and Assyria but 292 years after the flood of Noah.

The forces of Semiramis were collected from Media to the Mediterranean sea, when not more than 360 years had elapsed from the flood; for the true chronology will not admit of more; and it is not to be supposed, that all her male population was in her Army; but it is incredible that the number of her armed men could have been 1,300,000 horse and 500,000 foot—and if but half of these numbers, and of the army of Starobates were true, the greater part of southern Asia must have had an exuberant population.

Arabia, though partly barren, must also long before the time of Semiramis have possessed an abundant population, for when Ninus aspired to conquer all nations, he dreaded the power, and therefore sought the alliance, of the ruler of Arabia.

There is consequently no reason to suppose that the adjoining and fertile valley of Egypt was not equally populous, and if we may credit

* Gen.

Trogus Pompeus*, Egypt was a most magnificent and flourishing kingdom before Ninus was born. For his words in reference to Ninus are, Fuere quidem temporibus antiquioribus Vexoris Rex Egypti, &c.,—but there were in times more ancient Vexoris king of Egypt and Tanais king of the Scythians, one of whom invaded Egypt and the other Pontus; and the great population of that part of the world is proved by the conquests of Ninus, who with a large force subdued the Armenians, the Medes, the Bactrians and the whole country west of India.

It is unnecessary further to seek authority to prove the population of regions at this period; for no one doubts that Mizraim, the son of Ham, peopled Egypt, and that in the time of Abraham it was, as the Scriptures assure us, filled with great cities—and consequently must have been inhabited earlier than 200 years after, as well as before, the flood.

If the longevity, polygamy and fecundity of the antediluvian age—when life extended eight or nine hundred years, still prevailed, all who have been born in that space would be still alive, and the world overrun with people; for in our shortened span of years, while subject to great loss of life from war, disease and maritime enterprize,—we find the earth teeming with population, and its superfluity continually migrating to other regions.

If the increase is so great when the average life of mankind is probably not more than 40 years, how much more must it have been when the extreme limit of existence was 900 years. It does not appear, then, that there could have been any deficiency of population in the primeval ages; but that it must rather have been exuberant, and the world as numerously inhabited as at present, or much more so.

If Berosus or Annius are credible authorities, Pererius who cites them, has affirmed, and it is confirmed by Josephus, that the city of Enoch was situated near Libanus in Syria—and if other parts of Syria were peopled in the time of Cain—there is no reason why Palestine, another province of Syria, and the neighbouring region of Egypt, should not also have been inhabited in the seven or eight hundred years between the death of Cain and the flood.

Although the fragment from Berosus, with the commentary on it by Annius, is, in many places, incredible, the ancient copies being corrupted or lost, yet all things mentioned by Berosus are not to be rejected. St. Jerome, for such authors says, 'Bona eorum eligamus, vitemus contraria.' Let us choose the good of them and reject the bad. Berosus, in his first book, agrees with Moses concerning the deluge, and mentions those mighty men and giants who inhabited Enoch, commanded the nations and subdued 'all the world.' The phrase 'all the world' is often used in the scriptures for a part of it—as in Acts ii. 'Men of every nation under heaven,' and the sense of Berosus appears to have been the same, for he adds 'from the rising unto the setting of the sun,' which cannot be taken for a small portion of the world like the French phrase *tout le monde*.

It is not probable that Noah divided the world among his sons without due discrimination, or left them as discoverers; but rather that he directed them to the regions he had formerly known and inhabited.

* Justen lib.

The world must have been more easy to traverse before, than after the deluge, for Pererius confesses that Attica, in consequence of the flood of Ogyges, was uninhabited two hundred years—from which we may conclude that after the deluge, when the earth must have' been overgrown with wood and vegetation, for 100 or 130 years there could have been no great pleasure in proceeding to foreign regions.

Berosus* says, when mankind were exceedingly multiplied, 'Ad comparandas novas sedes necessitas compellebat'—They were compelled by necessity to seek new habitations,—for we find within 300 years after the flood, two armies, of such vast multitudes assembled, that the valley of Babylonia could not long have supported them, and all Asia, Scythia, Arabia, Palestina, Egypt and Greece appear to have been as fully peopled, as well as Mauritania and Lybia, and, if we believe Berosus, not only those regions, but in Spain, Italy and France, colonies were planted 140 years after the flood. In a progressive and increased ratio, then, must the earth have been inhabited in the 1656 years between the creation and the deluge, for if it extended over the universe for the sole purpose of destroying its inhabitants, it were a proof of the great multitudes of Antediluvians.

The antiquity of the Egyptians does not seem as fabulous, as is conceived by Pererius and other writers, for there can be no doubt that Egypt was peopled 2 or 300 years after Adam, and the sons of Mizraim may have left some pillars or altars of stone or metal, as monumental records of their ancient kings—which postdiluvian monarchs added to their pedigree from vain glory, or the corruption of their priests; fictitious matter may have been inserted in their annals; for Berosus and Epigenes affirm that the Chaldeans, in this manner, prolonged the memory of antiquity; both asserting that the use of letters and astronomy were known to the Babylonians 3634 years before the conquests of Alexander.—Annius concurs in this report, and traces the Egyptian records to the time of Enoch, who was born 1034 before the flood—and foretold the destruction of the world both by water and fire, and also the advent of our Saviour—according to St. Jude; but leaving these ancient annals to the reader to reject or adopt, according to his judgment, it only remains to add, that all writers concur in Egypt having been first peopled by Mizraim, and that it took its name from Egyptus the son of Belus before mentioned, and was divided into two regions, namely, that part from Memphis or Nicopolis to the Mediterranean sea, which was called inferior or lower Egypt and surnamed Delta; because the branches of the Nile formed a triangular island like the Greek letter Δ delta. That branch which ran towards the north east and the Sea, had on its bank the city of Pelusium—celebrated for the repulse of Senacherib. On the other branch is situated the famous city of Alexandria. Upper Egypt bounded by Memphis and Syene near Ethiopia, had the name of Thebaida, derived from the ancient city Thebes, which according to Homer, was adorned with a hundred gates, and therefore called *civitas centum portarum*, and by the Greeks *Dios Polis*; in the Scripture Nohannon, which signifies multitudes surpassing belief. Josephus† calls Egypt Mersin, from Mizraim, and Herodotus‡ says, it once had the name of Thebais;

* Lib 3. † Joseph lib. I. Ant. C. 7. ‡ Herodot. Euterpe.

Phut, the third son of Ham, took the next portion of land and inhabited Lybia, whose people were anciently called Phuter*; and Pliny mentions the river Fut in Mauritania flowing near Mount Atlas and called by the inhabitants Dyris. In Ezekiel xxx it appears that Phut, Cush and Lud were conterminí and associates with the Egyptians.

Mauritania† is the country on the western part of Africa, which forms the modern kingdom of Fez and Morocco. It was bounded by the Atlantic on the west—Gaetulia on the south—and on the north by the Mediterranean, and is sometimes called Maurusia—whose inhabitants were the Maurusii. Their country was near the column of Hercules—and is the same as Mauritania.—The inhabitants were also called Maurii from their black complexion (μαυροι.)

The sons of Canaan, who possessed the land of that name, and inhabited some of its borders were :—

1 Zidon.
2 Heth or Chethus.
3 Jebusi or Jebusus.
4 Emori or Emoreus or Amoreus.
5 Girgeshi or Girgeseus.
6 Hevi or Chiveus.
7 Arki or Harkeus.
8 Sini or Sinœus.
9 Arvadi or Arvadeus.
10 Zamari or Samareus or Zemarius.
11 Hamathi or Hamatheus or Chamatheus.

The most renowned of them were the Hethites, Gergesites, Amorites, Hevites, Jebusites and Perizzites : the Perizzites being descended from Zamari or Sematheus.

Zidon, the first born of Canaan, built the famous city of Zidon in Phinecia, which was afterwards in the lot of the tribe of Asser ; for Asser, Zabulon and Naphtali held a great part of ancient Phenicia, but the descendants of Asser could never obtain Zidon.

The Hethites or Hittites, the descendants of Heth or Cethus, constituted one of the seven principal nations of Canaan, who were appointed by God to be rooted out ; namely the Gergesites, the Amorites, the Canaanites, the Perizzites, the Hivites and the Jebusites.

The Hittites dwelled near Beerseba, towards Hebron—and the torrent Bison and about Gerar‡, which Moses makes the southern limit of Canaan, having Pharan to the south ; for Heth and his posterity resided adjacent to Beer Saba, or Puteus Juramenti, four miles from Gaza, and as far to the north-east as Hebron and Mamre, and consequently affording additional proof of the central situation of Hebron as it regarded the kingdom of David—and of its remoteness from Jebus, afterwards named Jerusalem. It was of Ephraim the Hittite, that Abraham bought the field for the burial of Sarah†, and of this nation that Rebecca uttered the lamentations that§ she was weary of her life for the daughters of Heth; "For if Jacob take a wife of the daughters of Heth, such as these, which are of the daughters of the land, what good shall my life do me?"

* Joseph. † Class. Dic. ‡ Gen. x. 19. § Gen. xxiii. a Gen xxvii. 46

Jebuseus was the third son of Canaan, from whom were descended the Jebusites, whose principal city was Jebus, afterwards called Jerusalem.

The Jebusites were a valiant and warlike people and retained possession of their country until the time of David, and even then were not exterminated ; having been tributary to Solomon. The Amorites received their name from Amoreus, the fourth son of Canaan; and inhabited the land east of the river Jordan, below the sea of Galilee—having the river Arnon and the mountains of Gilead on the east, and the Jordan on the west. Of this nation, the kings Og and Sihon were overthrown by Moses. The Amorites had various other possessions within the boundary of Canaan—as behind Libanus on the border of Coelesyria or Syria Libanica—in the mountains of Judea*, and in Idumea near its chief city, named Duma ; hence all the Canaanites were sometimes called Amorites†—and we find them to have been a powerful and warlike nation‡.

The fifth son of Canaan was Gergeseus or Gergesion, who dwelt on the east side of the lake of Tiberias or the Sea of Galilee, where Ptolemy fixes the site of Gerasa, which Josephus calls Gesira in the country of Decapolis. It was there that Christ cured the man possessed with the Devils, and the Gergesites desired him to depart from their coasts, because, as before mentioned, their swine, filled with the evil spirits, perished in the sea of Galilee.

Gergesus built Berytus, also named Geris, and afterwards Felix Julia. It was situated three miles from the river Adonis, in Phenicia, and contained a Roman Garrison, to which Augustus gave great privileges.

Heveus, the sixth son, and the father of the Hevites, dwelt under Libanus near Emath. Some of them were expelled by the Caphthorim§ ; but many remained during the wars of Joshua and until the time of Solomon ; for God was not pleased entirely to extirpate these nations : they were sometimes tributary to the Israelites, and at other times the instruments of God's wrath. "They‖ remained to prove Israel by them, whether they would obey the commandments of God."

The seventh son was Araceus, or Harki, who built the city of Archas, Arce, Arca, or Archis situated opposite Tripolis, between Libanus and the Mediterranean sea.

Sineus, the eighth son, settled at Caparosa¶, which Ptolemy finds in Judea, near Jebus ; and Junius to the south of that city. It is conjectured that Sineus founded Sin, also called Sim,** Simyra†† and Simirus‡‡. Peruis thinks Sineus inhabited the desert of Sinai.

The ninth son was Aradeus or Arvadeus, who built the city of Arados in the island of Aradus§§. Opposite to it, on the main land of Phenicia, they founded another city of the same name, which, from its situation, was afterwards called Antaradus.

Clement says, that in this Island St. Peter preached the Gospel and built a church in honour of the Virgin Mary. Both were places of

* Hierosolymitanus. † By St. Jerome. ‡ Ptolemy.
§ Mela and Pliny. ‖ Gul. Tyr. Vitr. ¶ Ezek. xxvii. 8.
** Deut. 1. Numb. xiii. †† Gen. xxv. Amos. ii. ‡‡ Deut.
§§ Judges iii. and ii. 20 to 23.

note and celebrated for their skilful seamen. "The inhabitants* of Zidon and Arvad were thy mariners."

There are various opinions concerning Samareus or Zamari, the tenth son; some suppose that he dwelt at Edessa in Coelesyria and founded Semaraim†, which Joshua places in the portion of the tribe of Benjamin.

Beroaldus observes that the city of Semaraim mentioned in 2 Chron. xiii. 4. was in the mountains of Ephraim, and that in the Latin version it is erroneously called Semeron.

The Hierosolymitan paraphrast makes Samareus the progenitor of the Perizzites and the Emissani,—called by Pliny, Hemseni, who fixed their habitation in Coelesyria, where they perhaps first resided, and afterwards, in the other places mentioned.

The Hebrew orthography, and 1 Kings xvi. 24. prove that they were not the founders of Samaria. The Samaritans were a perfidious race; for when the Israelites prospered they assumed their appellation, which in their adversity they disclaimed; denying a common origin; having on their return from the first captivity, become a mixed nation from their inter-marriages with the Assyrians and the Aborigines.

The eleventh son of Canaan was Hamatheus, or according to the Hebrew, Hamathi or Hamath, and without the aspirate Emath, which is confounded with Antioch by Josephus and St. Jerome;—but not the Antioch, which is situated on the river Orontes, on the frontier of Comagena, between Mount Cassius and the provinces of Pieria and and Seleucia, of which St. Peter was Bishop, and in which St. Luke and Ignatius were born; but that Antioch which was surnamed Epiphania, in the portion of Nephtali, and situated between Apamea and Emesa in Cassiotis.

There were two cities named Emath, for that on the Orontes near Emessa, is further off Canaan than the Israelites settled, and St. Jerome, confounding Emath with Epiphania, in the tribe of Napthali, and Epiphania north of Emessa, had the province of Laodicea between it and the portions of Israel; and if Lebanon was not divided among the tribes, Epiphania could not have belonged to them; for both Laodicea and Lebanica are between Epiphania and the Holy Land, and therefore Emath could not have been a part of Nephtali, as proved in xiii Joshua, who counting the lands unpossessed, names all Mount Lebanon toward the Sun rising, from Baalgad, under Mount Hermon, as far as Hamath; and it appears that Emath was not in Napthalim; because David accepted the presents of Tohu‡ king of Emath, and granted him peace, which it is probable he would not have done, if that territory had ever belonged to the Israelites; but that he would rather have re-conquered it, as he did their other possessions: but this argument may be controverted by the promise in Deuteronomy§, by which Emath might have been included, though situated beyond the limits of the promised Land, according to the description by Moses and Joshua; for it was on the other side of the Mountain of Hermon, which joins Libanus and was otherwise called Itures.

* Classical Dict. Virgil Œn. 4 v. 206. Strabo 17. Martial 5-ep. 29. 1-12-ep. 67. Sil. Ital. 4. v. 569. 1-10. v. 402. Mela 1. c. 3. 1-3. c-10 Justin 19. c-2 Sallust. Jug.

† Herodot. Euterpe. ‡ II. Sam. viii-9-10. Deut. xi-24. § 1. Kings xvi. 24.

Beroaldus says that St. Jerome was mistaken in writing Emath in the Latin version, for the Hamath mentioned in Joshua xix. 35. The Emath or Iturea being over the Mountains: and the city in Nephthalim should have been written Hamath; and the Septuagint understanding the difference, write it Ammath and not Emath, which belonged to Nephtalim on the south of Libanus east of Assedim, which St. Jerome writes Emath.

THE SONS OF CUSH.

The sons of Cush were	Seba Havila Sebta Rama Sabteca Nimrod	The sons of Rama were	Sheba and Dedan

Seba or Saba was the eldest son of Cush, who was the first born of Ham. To make a difference between Seba and Sheba the son of his brother, Rama or Regma, his name, according to Montanus, is written with a *Sheen* and that of Seba with *Samech*. Seba and Regma with his son Sheba, possessed the shores of Arabia Felix; Saba occupied the part towards the Red Sea: Regma and Sheba, the eastern coast of Arabia, on the shore of the Persian Gulph. Pliny says of them, Sabaei 'Arabum populi' propter thura clarissimi 'ad utraque maria porrectis gentibus habitant';—the Sabeans, a people of Arabia, famous for their frankincense, dwell on the shores of both Seas, namely, the Persian and Arabian or Red Sea.

Postellus says, this country was afterwards called Arabia, 'a populi mixtione' in which Ptolemy concurs, placing the city of Saba towards the Red Sea, and that of Rhegma near the Persian Gulph. Montanus gathers frcm Ptolemy, that Sabtœ also resided there; because he mentions a nation named Sabtœ near the Persian Sea, and the Missabathœ who were descended from them. But Montanus, without assigning any reason, fixes Regma, by the name of Rhama, in Carmania; while Josephus, consulting his fancy, places the habitation of Saba or Seba, on the border of Ethiopia.

Beroaldus thinks it strange that the Sabœi, who stole Job's cattle, should find Job in Traconitis, between Palestina and Colesyria; but it does not appear, that either the Sabœi on the Red Sea, or towards the Persian Gulph, could have despoiled Job. Those robbers being rather the Sabœi of the desert, in which Saba is situated; the same which Ptolemy calls Save and now Semicasac. From this Saba, in Arabia Deserta, came the Magi, or wise men, who worshipped Christ, according to Melchior, who says, that the Magi came neither out of Mesopotamia, as supposed by Chrysostom, Jerome and Ambrose, nor from Arabia Felix, as many believe; but out of Saba in Arabia Deserta, which city was called Semicasac*. By the opinion of Guilandinus, it appears that the Sabœi were the neighbours of Job; for both the other nations, as well as those on the shores of the Persian Gulph

* Guilandinus. Melchior.

and the Red Sea, are so separated by large deserts, that there is no possibility of strangers passing them, especially with much cattle, in consequence of the mountains, the heavy sands and the want of water: 'Ubi nec homines nec bestiæ videntur, nec aves, imo nec arbores, nec germen aliquod, sed non nisi montes saxosi, altissimi, asperrimi;' where neither men nor beasts are seen, nor birds; nor even trees, nor any pasture—but only high, stony, craggy mountains. Beroaldus and Pererius suppose that the Queen of Saba, who came to visit Solomon, was of the Sabœi, on the east of Arabia Felix; but Solomon commanding the tracts of Arabia Petrœa, between Idumea and the Red Sea, as far as Midian and Eziongeber, favours the presumption that she inhabited the west part of Arabia Felix; and therefore, being his neighbour, might have entered his dominions without difficulties or danger from internal enemies. It is plain, however, that Seba or Saba, Sabta, Raama or Regma, with his sons Sheba, Dedan and Sabteca, were all possessors of Arabia Felix and deserta; only Havilah and Nimrod, who possessed Arabia Petrœa, dwelled on the east side of Cush. Pliny and Ptolemy trace the name of Sabta in that of the city of Sabbatha or Sabota in Arabia Petrœa, and call it Sabotale, within the walls of which were found sixty temples. Ezekiel unites the father and the son. "The merchants of Sheba and Raama were thy merchants." Josephus is followed by St. Jerome, in fixing the abode of Dedan, the son of Raama, in the west of Ethiopia, affording another instance of that country being mistaken for the land of Cush. Ezekiel unites Sheba, Raama and Dedan; making Dedan in the 15th verse, and Sheba and Raama in the 22nd, to be merchants of Tyre; for if Dedan had dwelled in the west of Ethiopia, it would have been very remote from the habitation of his father Raama and his brother Sheba; Ezekiel* describes the Dedanites as "merchants in precious cloths for thy chariots;" while the western Ethiopians never saw cloth till it was brought to them by the Portuguese, the merchandise of their country being hides, ivory, gold, amber, civet and rice, which they exchanged for linen and iron. But in those days the interior of western Ethiopia was unknown; and being under the torrid zone was deemed uninhabitable. It is therefore very improbable that western Ethiopians should have passed either by land or by sea to Tyre, at the extreme end of the Mediterranean sea; but to put it beyond all dispute, that Dedan dwelt near the rest of the sons of Cush, let us hear the words of Jeremy,—"Fly ye inhabitants of Dedan, for I have brought the destruction of Esau upon him," where it appears that Dedan was contiguous to Idumea, which was a northern province of Arabia Petrœa, to the south of Canaan; and Dedan dwelt in the north of Arabia Felix, where it united with Arabia Petrœa, the land of his grandfather Cush. This proximity of Dedan to the Idumeans is also confirmed by Ezekiel. "I will stretch out mine hand upon Edom, and destroy man and beast out of it, and I will make it desolate from Teman; and they of Dedan shall fall by the sword."

St. Augustine says that the names of the sons of Mizraim are in the plural number, in order to denote the nations descending from them; the Hebrew termination *im* being the plural and *aim* the dual.

* Ezek xxvii. 20.

Ludim, the eldest son of Mizraim, was the father of the Lybians in Africa, and his other brothers dispersed in the adjoining regions. There is also a Lud among the sons of Shem, who is distinguished from Lud, the son of Mizraim, by being written Lud in the singular number, yet these names and nations are often confounded, notwithstanding the difference in the names and nations; for Ludim, the son of Mizraim, was the progenitor of the Lybians in Africa, and it appears from the prophet Jeremy that he was seated not far from his father Mizraim, and the Egyptians were assisted by the black Moors and Lydians*. In Ezekiel xxx. 5. "Phut and Lud are united; and all the common people and the men of the Land that are in league shall fall by the sword."

In our English version it is rendered "Ethiopia and Lybia, and Lydia and all the mingled people and Chub, and the men of the land, that is in league shall fall with them by the sword;"—or in other words, the sons of Cush, who were Cushites, the sons of Mizraim, who were Egyptians, and the Lybians or descendants of his son Lud, with other inhabitants of Egypt and Africa shall fall together. A nation of Lydians is found in Africa†, as appears in the text above cited‡, but the Hebrews call Lybia in Africa, Ludim, though in second Chron. xii. 3. they are called Lubim or Lubœi: and Pintus on the 5th verse of Ezek. xxx., says that Lud is not intended to signify Lybians, for he applies this threatening to the people of Lyda, a city between Egypt and Palestina, which would be appropriate were that city so situated; but Lyda or rather Lydda is the city afterwards called Dios Polis, in which St. Peter cured Eneas of the Palsy. It is near the torrent Gaas, and Joppe, the port of Jerusalem, yet this city might have been founded by Lud, for there are many cities of the same name in every region. St. Jerome and Postellius make Lehabim to be the father of Libya, who was the third son of Mizraim. The other sons have no countries assigned to them in the scriptures, excepting Casluhim and Caphtorim, from whom were descended those Philistines, called in scripture Peleset. The Casluhim inhabited Cassiotis, a region on the border of Egypt, towards Palestina, in which are found the lake Sirbonis and the mountain Cassius, near which Pompey was buried. Caphtorim is situated near Casluhim in that part of Egypt called Sethrotis§ and Jethrotis ‖ from the city of Sethron, which was called by Ptolemy¶, Hercules Parva. The Casluhim and Caphtorim were descended from the Philistines and called by the Septuagint Allophyli, which signifies Alienigenœ, strangers or of a foreign race.

These Philistines inhabited the southern part of the Holy Land, and from them Palestine received its name. Their principal cities were Gaza, Ascalon, Azotus, Geth and Accaron. The people of them were called Gazœi, Gethœi and Accaronitœi. Isidore affirms that Ascalon was first called Philistim, from which the adjacent country received its name. The first known king of the Philistines was that Abimelech, who had a partiality to the wife of Abraham, and who made a covenant with him. At that period the king Abimelech dwelt in Gerar, and it is written that he was king of the Philistines** Isaac went unto Abi-

* Ezek xxv. 13.
† Jer. xlvi. 9, 6.
‡ By Hierosolymitanus.
§ Arias Montanus.
‖ By Strabo.
¶ By Stephanus and Pliny.
** Ortelius. Gen. xxvi. 1.

melech, king of the Philistines, unto Gerar. This, or some more ancient Abimelech, governed with renown, and his successors adopted his name. The Philistines ruled the country from the Mediterranean Sea to the north, as far as Gaza and the Nile. The Anakims, or strong giants, were of these Philistines, and Goliath was of Geth—one of the five cities above mentioned. Firanus says that they had five kings.

They defeated the Israelites several times for above 150 years, and held them tributary until they were weakened by Sampson and Samuel, and finally subdued by David.

It has been objected that the Israelites took these cities from the posterity of Mizraim, and not from the descendants of Canaan. To this Pererius observes, that although the Palesteens, or Philistines, held those countries in the life of Joshua, yet, at the time of the promise, they belonged to the Canaaites, as appears in Deut. ii. The Hevites dwelt in the villages as far as Gaza—and the greater part of their inhabitants being Canaanites, it is probable that their name predominated, for the Philistines were descended from Caphtor, and the Hevites from Mizraim, and not from Canaan, for besides Moses, the Prophet Jeremiah testifies that "The* Lord will destroy the Philistines, the remnant of the issue of Caphtor"—and in Amos† the Philistines are said to be the remnants of the Caphtorim—"Have not I brought up Israel out of the land of Egypt and the Philistines from Caphtor and Aram from Kir?" for so this passage is read by the learned. The vulgate has it—Palestinos de Cappadocia et Syros de Cyrene—but this conversion is condemned by Beroaldus where Caphtor is taken for Cappadocia, and Cyrene, for Kir; for Cyrene was a city west from Egypt, between Ptolemais or Barce, and Appolonia and Kir in Asia under the Assyrians. Junius, and the Geneva have it Kir, and not Cyrene. Pererius following the vulgate calls Caphtorim Cappadocea—and yet it is probable that he meant Cappadocia in Palestine, and not Cappadocea by the Sea Pontus in the north of Asia Minor; for it is not certainly known whether they inhabited Sethreites or Cappadocia of Palestine, and he may therefore expound Cappadocia to be ambiguous as well as Cyrene, which he takes not for Cyrene in Africa, but for a place in Media; for it is written in 2 Kings that Tiglath Pulasser, King of the Assyrians, carried away the inhabitants of Damascus to Kir, which Josephus seems to understand to be Cyrene in Media—calling it Media Superior, it having been the custom and policy of the Assyrians to extirpate the people they conquered, as they did the Samaritans or Israelites and other nations—and hence Kir was termed Syro Media, because the Syrians were there kept in captivity by the Assyrians.

It has been thought that Caphtor is derived from כפות Cafot and תור Tur. Cafot being the Sunskrit and Tur the Hebrew name for a dove,—and these words being in process of time united, make the well known word Kubootur,—a Pigeon. Cafotesi is the name of the deity in the form of a dove worshipped by the eastern nations. The Dove was the emblem of the Babylonians,—and Jesus, when he was baptized, went up straightway out of the water: and, lo, the heavens were opened unto him, and he saw the spirit of God descending like a dove and lighting upon him‡.

* Jeremiah lxvii. 4. † Amos ix. 7. ‡ Matthew iii. 16.

MEDICAL SKETCHES.

No. I.

To the Editor of the "India Review."

My Dear Mr. Editor,

When your correspondent Catholicus announced that he was about to publish his interesting sketches, he at once allayed your anticipated apprehensions by declaring that they were not to be those of the *pencil* but of the *pen*,—delineating the manner and preaching of ministers in the Pulpit. Now, whilst I also declare my intention to send you Sketches, it may be some satisfaction to your friends, in the event of your swooning away, to know that they are to be of the characters of men who can quickly bring you round again.

I trust, however, that your medical readers will not tremble lest I am about to consume them in satire and wrath. I pledge myself nothing to "extenuate or set down aught in malice." There is not a single individual among the practitioners of Calcutta, a hair of whose head I would injure,—far less detract from his practice, his character or reputation.

It is, then, the Medical Practice, and the Practitioners of Calcutta, I am about to delineate,—the theme and the wonder of aspirants to fame and wealth even among the distant students of the schools of London, Edinburgh and Dublin, as indeed it is throughout the length and the breadth of the world of medical men on this side of India;—all aspire, all hope, ultimately, to settle down at the Presidency in possession of that great prize the practice of Calcutta.

For the attainment of this object, patronage, tact and skill, are, it may be supposed, more or less indispensable. The subject of my present sketch adopted sure and never failing means.—Although not one of the tallest men in Calcutta, he does not lack advantages equally imposing. He is gifted with *assurance*, and is remarkable as well for his gentlemanly demeanour as the encouraging kindness of his manner. When I say assurance, let it not for a moment be supposed, that I adopt the phrase as a term of detraction. It is a quality of mind for which most men of merit have been remarkable. The Marquis of Wellesly possessed it to a great extent, or he never would have penned the letters which he did to his masters the Court of Directors; neither would he have been distinguished as the first Governor-General India ever possessed. Lord John Russell is another example: it was by his remarkable *assurance* that he insisted upon and ultimately obtained the passing of the Bill of Reform.

Neither of these eminent statesmen, however, in respect to stature, could be designated great; but mentally—intellectually—they unquestionably lay claim to that proud and enviable distinction, and they, I repeat, have been remarkable for their *assurance*. By this valuable and sterling quality, the subject of my sketch obtained the advantageous

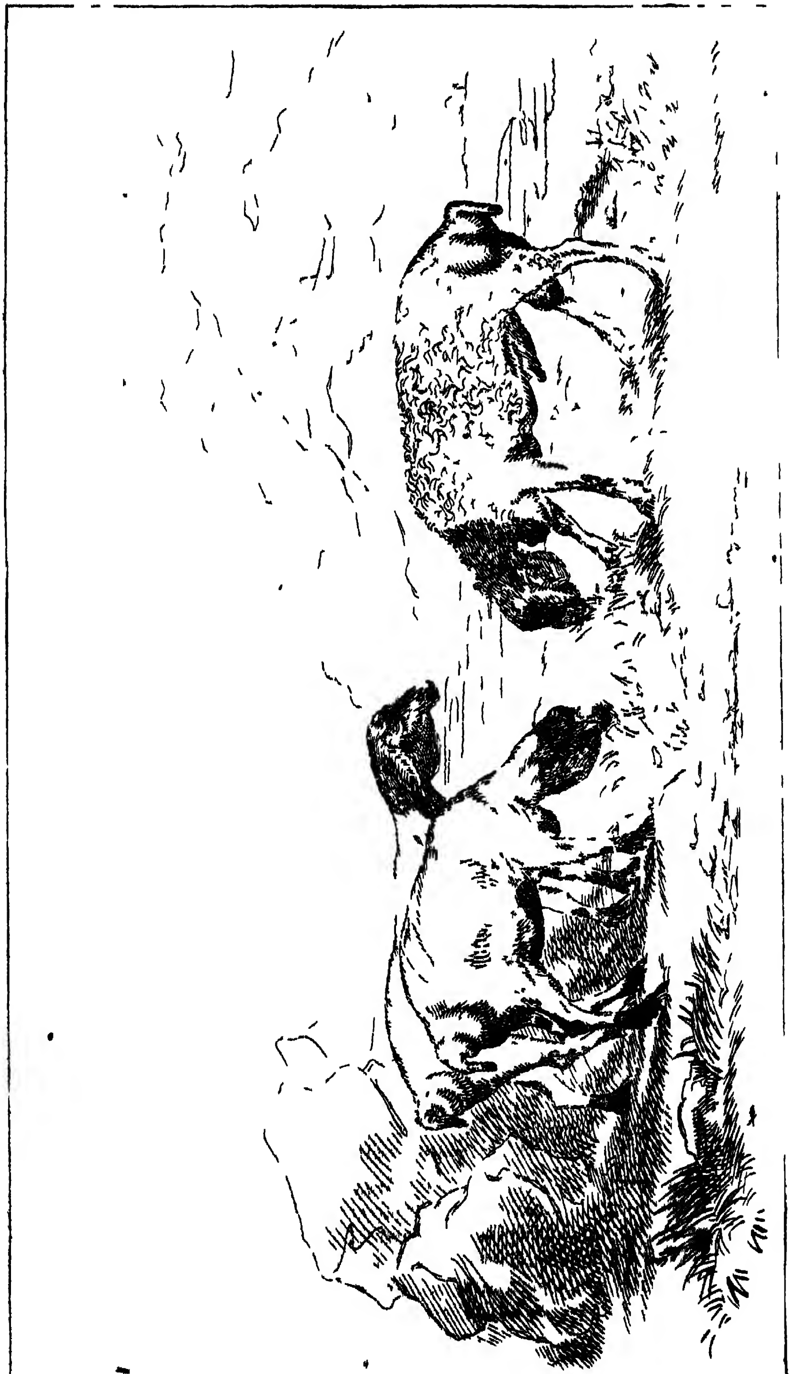
position of serving under the very eye of the first person in the state, who was not long ere he recognised his merits,—and behold him at length,—to many an object of envy and surprise—holding, and that almost immediately after his landing in India, the very best appointment as an introduction to the medical practice of Calcutta.

I have already inferred that he possesses great tact and skill, indespensable qualifications with many for the attainment of a chief presidency appointment. With these he comes to the bedside of the patient, who reads in his contenance that self consciousness, that innate conviction of his being the A. 1. in his profession which gives an assurance that there are none more capable than himself of comprehending, however complex, however obscure, however fearful, the assailing malady.

This assurance, this tact and skill are never more conspicuous than when he is one in consultation: on such occasions many medical men who have witnessed this marvellous assurance in the features of their professional brother, have regarded it as a death blow to all their hopes of future practice in the family, if it have happened to be one wherein their opinions and practice had previously been received and respected. Although, however, it may have been, as it no doubt often has been, a death blow to *their* prospects it has not been so to those of the patient, who, on the contrary, has been inspired with confidence and hope. His own family medical adviser had, probably, never bestowed upon the case so careful an examination; had never so aptly questioned, or pressed enquiry with such keen inquisitiveness, or so commented on matters of diet and habit,—matters which had possibly been most blamefully disregarded by the stipendiary to whom the patient had entrusted the conservation of his health and his life.

I have said that this assurance, tact and skill, may be of great benefit to the patient, but I must be understood to mean only as an exception to a general rule. The regular medical adviser to the family may be possessed of higher and brighter talents than those of his consulting friend,—but they are veiled by his retiring modesty, or deep humility, or shrinking on witnessing the assurance of the man of tact. The medical attendant is thoroughly acquainted with his patients habits, manners of life, and with the nature of his disease, its commencement, progress and variations. The patient is therefore often sacrificed by falling into the hands of a stranger who knows no more than what he has gleaned from his patients own detail.

The subject of my sketch had great advantages upon his debut. He co-operated with, and had the opportunity of witnessing the practice deduced from extensive Calcutta experience of a justly acknowledged first rate practitioner, who is of the Abernethian school; who looks to the first passages: calomel in large doses and small; colocynth, aloes, scammony, gamboge, tartar emetic, senna, salts, jalap and its compounds, constitute his sheet anchor, and under his active, bold, and decisive measures disease rapidly disappears. If he bleed he does it copiously and fearlessly, and knocks down congestion and inflammation at the first blow. He knows no temporizing measures, but aims at and exterminates the root of the malady, and the patient recovers as by a miracle.



Now to the same extent and degree in which the subject of my sketch has followed the foregoing practice he has been eminently successful. He is remarkable for his Surgery,—has been selected for particular operations, which he performs with adroitness, skill and success, and is every way worthy of being a London student to the first surgeon of the age in which he lived. For many years he has been a Calcutta practitioner, and has suceeded to the practice of one of the leading members of the profession, by whom, in compliance with the custom common in India, as in Europe, of medical men, upon retiring from practice, appointing a successor, he was introduced to the aristocracy of Calcutta. Those who retained his services have doubtless much cause to be satisfied with the selection. He is a man of unquestionable talent. It is, indeed, for the interest of the retiring practitioner that he supply his place with one whose abilities are equal to his own; and that he furnish a faithful history of the management and medical treatment of the families he attended for the guidance of his successor. Hence one vast source of improved knowledge which the subject of my sketch derived from the experience of his predecessor, who was confessedly equal, if not superior in talent to most of the practitioners of Calcutta.

Some years back, the subject of my sketch was a regular attendant, with many other able practitioners of this city, at the meetings of the Medical and Physical Society, and took a lively part in the important, interesting, and animating discussions which took place on the valuable papers presented to that then popular and distinguished Institution. It is greatly to be regretted that this popularity has of late years much diminished. Why this is so, or why its meetings are so scantily attended by medicos, it is not my intention in this place, at least on this occasion, to consider, or further allude to than merely to express my regret at the fact.

To conclude,—the subject of this notice is the author of many valuable clinical reports which have been published in various shapes, constituting a mass of intelligence highly valuable to the young practitioner. His style is perspicuous;—there is nothing imaginative or hyprothetical in his composition;—he is obviously content with the credit exclusively of bearing testimony to simple matters of detail in the treatment and symptoms of various affections as they have been developed and managed in the wards of his Hospital.

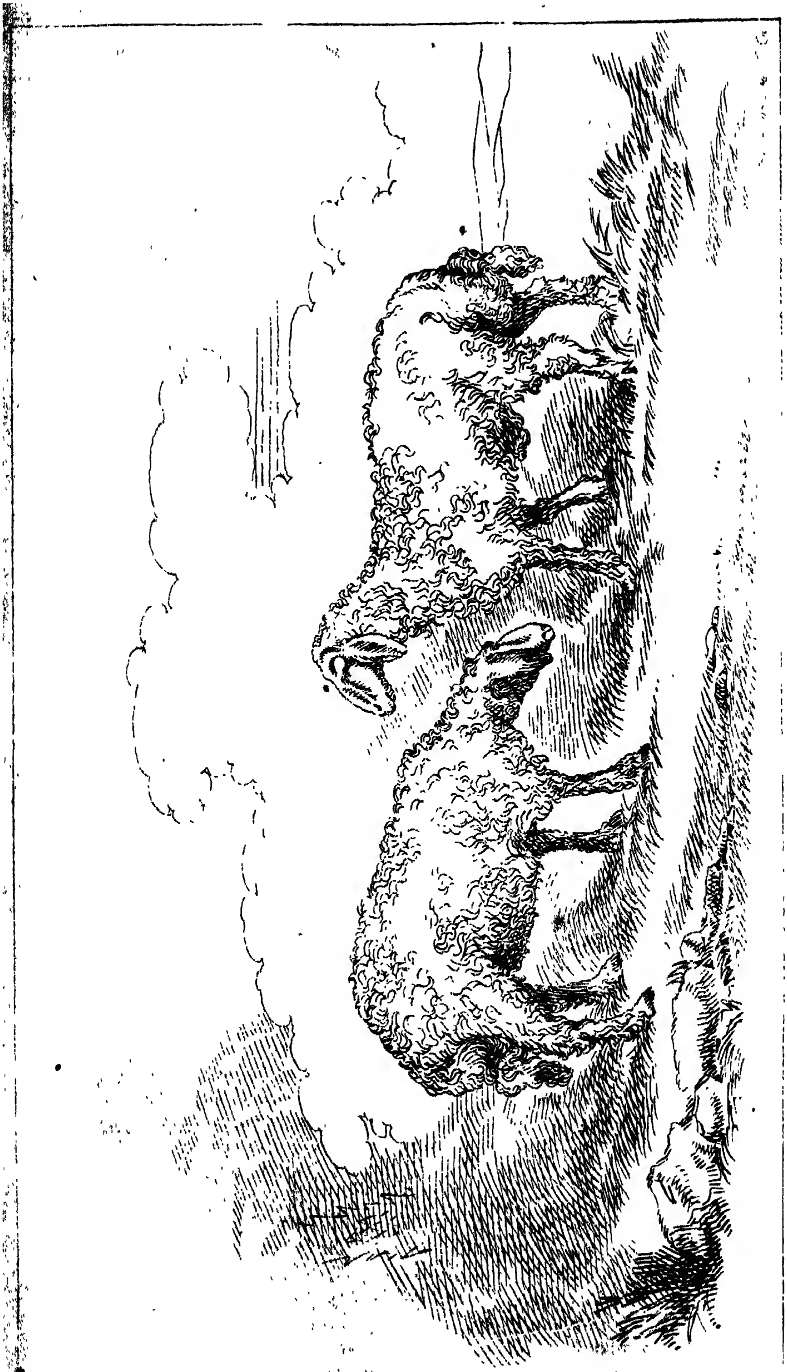
PHILADELPHUS.

ABYSSINIAN AND BEDOUIN SHEEP.

Favored by the kindness of Capt. Wall of the steamer *Tenasserim*, we have given our readers, in the present number, portraits of the sheep brought round by that gentleman from the Red Sea. Those with the black heads are of the Abyssinian breed, and were obtained at Aden; the white ones are called 'Bedouins:' though neither strictly come under the characters assigned by travellers to the sheep of those countries.

A breed of sheep, with an abnormal accumulation of fat in the posterior regions, is to be found, differing more or less, along the range of the old continent from the Cape of Good Hope to Kamschatka. It is of two kinds, the fat-rumped and the fat-tailed. The former are found purest in central Tartary, where comparative isolation in the midst of its boundless wastes secures the breed from contamination. The wealth of the nomadic tribes of Kerguis and Calmucs lies principally in sheep, and it is not uncommon for a Tartar to own a flock of a thousand. The peculiarities of the genuine Tartar variety consist of a large yellowish muzzle, long hanging ears, slender legs, gaunt and muscular body, swelling gradually with fat towards the posterior, where a solid mass of fat is formed on the rump, dividing into two hemispheres which are shaped by the hips, holding a little button of a tail in the middle. This extraordinary conformation, called the *uropygium*, is attributed by Pallas to the effect of the bitter saline pastures of Tartary; the influence of which, concentrated by the succession of generations, settles on the tail! The reasons urged for this fanciful hypothesis are the small size of the *uropygium* in such districts as are scantily impregnated with wormwood and salt: and also the diminution which takes place in the enormities of such individuals as are transported to the south of Siberia. The wool of the Kerguise sheep is tolerably fine, but mixed largely with hair. With the Calmucs the hair diminishes, and in the south-eastern provinces of Russia the wool is almost pure, but yet of inferior quality and fit only for coarse stuffs. Coming down to Persia, we find the wool begins to curl, but it is still coarse, short, and hairy. In Syria and Palestine the uropygium is removed from the rump to the superior part of the tail; and flocks of the African or fat-tailed kind appear. From scriptural authority it is probable that the primitive breed of these regions was the fat-rumped, and that the other has been an introduction from Egypt. As we go southwards, the situation of the tumour is removed to the tail. The sheep of Egypt are nearly equally divided between the species, and the very long tail with black head and neck appears as a common peculiarity. Running further south into Ethiopia, the size of the animal is found to increase, as also the length of tail; while the fat rumped variety which are scattered round seem to become of small but compact dimensions. The few travellers into that wide tract of land between Abyssinia and the Cape afford us but little information as to the domestic animals of the country. They state four and even six horns to be no uncommon appendage, and the general appearance to approximate to that of the Cape sheep. The Cape sheep—the native breed—are the pure broad tailed, and are too well known to need further description.

We have now glanced over the geographical range of these singular animals. Their fleece is always of an inferior quality, being hairy to a great degree. Intermixture with our Indian breed does not, therefore, hold out any prospects to commercial men. It is to the Merino, and the Merino alone, our efforts should be directed. The Australian is decidedly an affiliation of our Indian stock, and the repeated crossing with the pure blood has raised the wool of that colony to the rank it holds. At the Cape, greater difficulties in naturalising the Merino were encountered than we need apprehend, but they have been successfully grappled with, and that by the exertions of individuals. The



prizes established so long by the Agri Horticultural Society of India seem to have effected little or no good, and it is with no particular concern that we see them about to be abolished. They are on an erroneous principle. A large premium offered for the exhibition of a flock of about 30 or 40 animals, with a moderate but *decided* improvement of the wool, would, we think, do more towards starting the right spirit afoot. As it is, a good deal of exertion is made to bring a splendid animal from the Cape, or Van Dieman's land ; he becomes a medallist, a show to the friends of the owner, the pride of the poultry yard, and there his usefulness ceases. The fundamental error of our training, whether of our youth, of our turnips, or our sheep, is the giving rewards and encouragement to one or two monsters, be they senior wranglers, imperial Swedish, or Southdowns : instead of producing a multitude of thoroughly disciplined clear reasoners, even if their attainments be not superfine,—sweet turnips, and eatable mutton. Macaulay, in one of his quiet sentences, condemns prize sheep as fit only to make tallow candles, and prize poems to light them. We would suggest to the agricultural society the consideration of these hints. Exceedingly meritorious animals might be assigned extra medals, but the regular awards should be for the production of *numbers progressively improving in quality.*

The real incentive to national improvement in any article of production is the trade, the saleable price of an article. The increase of *quantity* and *quality* in our wool, our wheat, &c., depends upon the market we can find for them. And thus the great obstacle with which we have to contend at setting out is the deteriorated mercantile spirit of the community,—the anxiety to make hits,—the perfect indifference to anything that requires maturity of labour. It is in vain to point this out; the error must and will, by the immutable laws of science, correct itself. Yet as the Apostle said, "my brethren, these things ought not so to be." To the enterprise and good sense of sober thoughtful individuals the regeneration of our manufactures and our commerce must be left. They will work their way without the aid of Societies ; they will do so in despite of them. But it makes all the difference to the community in point of *time* (which is wealth) whether these men shall be encouraged or not. The *judicious* appreciation of labour is a stimulus not lightly to be estimated: it is the end of societies because it is all that they can do. To that end then, they ought to direct the schemes of their rewards.

But we have wandered. *Revenons à nos moutons.* The Bedouin sheep are white, with slightly curling fleeces of wool and hair in nearly equal proportions. They are large in size, and crosses with the merino and the *Dasee* are worth trial. The Abyssinian breed, on the contrary, present no such prospect ; not having a vestige of wool, but long wiry hair, and in size being somewhat below the *dasee* bharee. They are all, as may be expected, of a hardy constitution, being permitted luxurious pasturage only at the subsidence of the Nile, when the Bedouin shepherd drives his flock down to its banks. The rich feeding soon shews its effect on the sheep, and at the first symptoms of the rot, they are removed immediately to their arid heaths and dry beans till next season. In the Arab's tent the sheep takes the place of the dog, who retrogrades in the scale of civilization, and is a fierce, lazy, treacherous creature, just suffered to live by his master.

We have, however, no further room for any more gossip. To those anxious to have a scientific as well as a most amusing work on sheep we shall conclude with recommending Hamilton Smith's volume (in the English translation of the Regne Animal) on Cuvier's order Ruminantia.

COLOURED DAGUERREOTYPES.

There is scarcely any discovery in the present day of a more surprising nature than that of Daguerre, certainly none as an art that appears to have made, or to be making, more rapid advances in improvement. Of the growing importance and utility of this novel art several extracts in our present number will afford sufficient proof. Its popularity has never been lessened ; day after day has but added to the interest it excited at its first announcement ; its professors have multiplied exceedingly, and few amongst them who have not professed to have made some notable improvement on the original discovery. Where these discoveries and improvements will end it were difficult and vain to conjecture. If the *fastidious* could raise an objection to the Daguerreotype as a substitute for the Limners art it would be in the unpleasing, death like semblance of its representations, however faithfully delineated, of "the human face divine," more particularly as respects the mouth, where from the want of reflected lights, the full shadows fall into each other, and materially aid in producing that cold and unexpressive character to which we have alluded. Even that objection, however, strong as we admit it to be, is likely to be overcome if we may credit the assurance conveyed to us by the public prints, which state that an Italian painter Signior Lecchi has discovered the art of colouring Daguerreotypes and is, or was a short time back, engaged at Brussels copying the pictures of Rubens, Vandyck and other eminent masters.

The means by which Signor Lecchi effects his purpose are of course unknown to us at present, but report says that it is in the process itself that the colouring is effected, differing entirely from the method patented and practised by Mr. Beard, an English professor of the art. As this may not be generally known or understood, we lay it before our readers. Mr. Beard uses three methods :—

"By the first method, the object is obtained by reducing the colors to an impalpable powder, and depositing them upon different parts of the picture, in succession ; the extent of each color being determined by a pattern or screen, resembling a stencil plate.

"The mode of operation is as follows :—The Duguerreotype picture is first placed in a rectangular frame, which is formed with a projecting edge, of about one-twentieth of an inch in thickness. Over this frame a piece of glass or mica is laid, and a tracing is made upon it, with coloring matter, of the shape of those parts of the picture that are to be colored. From this tracing a number of patterns or screens are formed, one for each color. Each screen consists of a light rectangular frame, covered with tracing paper, upon which all those parts that are required to be of one color are traced, and the space included

between the traced lines is cut out ; so that when the screen is placed upon the picture, the tracing paper will cover its surface, except those parts which are required to be of a uniform tint.

"The colors are prepared by grinding them to an impalpable powder, with a week solution of gum-arabic, isinglass, starch, or other similar material ; they are then dried in a stove, (kept at a heat somewhat less that 212° Fahr.) and, after being passed through a fine sieve, are ready for use. In applying these colors, a number of boxes, of a size sufficient to admit the picture, are employed, and into each box, the number of which varies according to the tints required, a few grains (say about fifty) of color are deposited. The color is agitated with a large soft brush, until a dust is created in the box, and the picture, covered by one of the screens, being then introduced, the particles of color settle upon the screen, and upon those parts of the picture that are not covered by it. After this operation, the picture is withdrawn, the screen taken off, and the color removed from the shaded parts, by means of a small pair of bellows ; the remainder of the color is then attached to the picture by breathing upon it, which partially dissolves the gum, and the process is completed.

"The second improvement consists in mixing the colors with gum-water, and applying them, with a hair pencil, to the underside of the glass that covers the picture ; so that when the latter is seen through the glass, it will present the appearance of a colored picture.

"The third and last method consists in using the colors in a dry pulverized state, as in the first improvement, dotting them on to the picture, with small brushes, in a similar manner to stippling ; the colors are then fixed by being breathed upon*."

TO FIND A STRAIGHT LINE, THAT SHALL BE EQUAL TO THE SEMIPHERIPHERY OF A GIVEN CIRCLE.

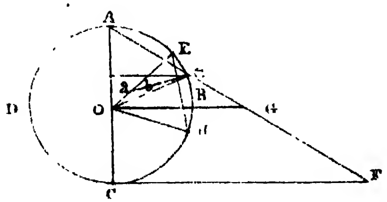
It is necessary to explain that the following demonstration of the above problem appeared in No 82 of the Review, published in December last, page 735. By carelessness or oversight on the part of the draughtsman the diagrams were lost and consequently omitted ;—this was not discovered until after the number had passed through the press. In justice to the author, from whom we have received a communication on the subject, we insert in our present issue so much of the original article as related to the missing diagrams, copies of which have been forwarded to us by the author, and are now annexed.

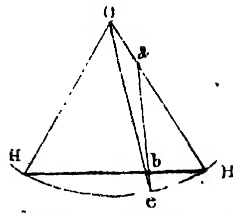
"Let A B C D (fig. 1) be the given circle, A C the diameter, O the centre. From C draw C F perpendicular to A C, and produce it indefinitely. From O, the centre, draw O B also perpendicular to A C meeting the circumference in B. Bisect the arc A B in E, join O E. From E draw E H equal to the radius O E, and meeting the circumference in H. In O E take O a equal to $\frac{1}{4}$ (one fourth) of O E, and in E H take E b, equal to $\frac{1}{3}$ (one third) of E H. From a, in O E, through the point b in

* London Journal of Arts Sciences and Manufactures.

E H draw a straight line meeting the circumference in C.

Fig 1. Fig. 2.





From A through the point C in the circumference draw a straight line meeting the produced perpendicular C F in F. C F is the line required. Produce O B till it meets the line A F in G then will O G be equal to the length of the arc A B. And for the areas; the triangle A O G equals the quadrant A O B, and the triangle A C F equals the area of the whole circle. To prove the above by Trigonometry join O H, *o c* (fig. 1) we have then an equilateral triangle as in (fig. II). we may therefore assume any quantity as the length of the sides, and a number divisible by 3 and 4 will simplify the calculations (E *b*) is $\frac{1}{3}$* (one third) [E H], and [*o a*] $\frac{1}{4}$ (one fourth) [O E] and the triangle being equilateral, the angles are equal, therefore the two sides *a* E $\frac{3}{4}$ [three fourths O E], E *b* [$\frac{1}{3}$ one third E H] and the included angle *a* E *b* [60] are given to find the angle E *a b*, we shall then have the two sides *a* O [$\frac{1}{4}$ O E] O *c* [equal to O E] and the opposite angle O *a c* [180° —E *a b*] given to find the angle *a* O *c* or E O *c*. By [fig. I] the right angle A O B is bisected by the line O E.—A E *c* therefore is an angle of 45° and by fig. II, having found the angle E O C we have [fig. I] the whole angle A O *c* given. From (c) draw [*c d*] perpendicular to A C, then by similar Triangles A *d* is to *d c* as A C is to C F but A *d* is the versed sine, and [*d c*] the sine of the angle A O *c* therefore (ver. sin. A O C) : (sin A O C) : : (diameter A C) : C F.

S. K. C. E.

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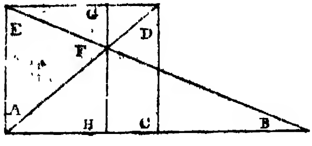
* A simple and neat method of trisecting a straight line, is the following.



Let A B be the line, bisect it in C, from C draw C D perpendicular to A B and of any length from either end as A; draw another line A E equal and parallel to C D join E B D A E D. Through the point F in which the line E B D A intersect each other, draw another perpendicular equal to D C or E A as G H A H is $\frac{1}{3}$ (one third) of A B, repeat at the other extremity of the line A B and it will be trisected as may be easily shown by the similiar triangles, and proportional lines.

S. K. C. E.

CORRESPONDENCE.

Early Artesian Wells.

To the Editor of the India Review.

My Dear Sir,

The accompanying was found among a number of papers, of the late Colonel Colin Mackenzie, in my possession. It refers to a well at Sheerness, dug by Sir Hyde Page, to supply the deficiency of water at that station. The article is written evidently by Sir Hyde himself and appears to have been published before, but where—I cannot trace. The whole of the shipping, as well as the neighbourhood, besides the garrison, are supplied from this well, and another at Queenborough in the neighbourhood. The latter was dug originally in the reign of Edward the First, and lined with Portland stone to the depth of 150 feet, I believe. It was forgotten and filled up when the importance of the borough decayed; but when the scarcity of water began to be felt by the growing numbers of the district, it was re-opened and sunk to a much greater depth. Any history of Kent which you may possess, would I think give a more detailed account.

Your's faithfully,

S. G. T. H.

KINGS WELL, FORT TOWNSHEND, SHEERNESS.

This undertaking was at first considered as a mere experiment, the probability of success being much against it. I, however, thought the attempt where a Dock yard of great consequence to the Navy was established, should be made; and carried, as far as it could with a proper attention to economy in laying out the money of the Public. This was my opinion signified to the Board of Ordnance. I have already mentioned the answer thereto, expressive of approbation and full powers to employ proper persons, and proceed upon the undertaking, such previous steps seemed highly necessary as in all works of difficulty great confidence is as much required as able Workmen, or good Plans, and the favorable opinion His Majesty was graciously pleased to express publickly of the project at Sheerness, tended very much towards the final success. The countenance and support also of General Craig, governor of that Garrison, greatly encouraged perseverance in a work of such difficulty. I employed a very ingenious man, (Mr. Cole of Lambeth) as a chief person in this business, and received every assistance I expected from his experience and judgement in mechanicks—and it is but justice to him to express that the success of the work greatly depended upon his attention and the able workmen he procured from distant parts of the kingdom. The greatest acknowledgment is also due to the ability of Lieut. Humfry of the Engineers,

and Mr. Marshall the Ordnance Overseer, who were constantly on the spot, and carried my orders into execution with the greatest zeal for the success of the undertaking as well as judgement. The mentioning those Gentleman's names is (as well as justice to their conduct) to recommend harmony and mutual exertion in any future work of this nature, as without an equal attention in every one, I should greatly doubt success, even admitting the same plan in all other respects to be strictly attended to, and there would be great difficulty and danger to the lives of the workmen if carelessly carried on.

The experiments in trying the different strata, and preparing materials, commenced 17th April, 1781, the well in Fort Townshend was begun 4th June the same year, and finished 4th July, 1782. A circle 22 feet diameter was first marked out on the ground, and the space excavated to the depth of 5 feet, after which pieces of wood, called Ribs, upon the curve of a diameter 2 feet 4 inches, and about 9 inches scantling, were placed to form a complete circle within the excavated part at the bottom, above which other circles of the same nature were placed, and supported by upright pieces of scantling having short boards introduced by the intervals, which afterwards were pressed upon the circles or ribs, between them and the exterior parts, these when united formed one frame of wood from the bottom to the top, or rather higher than the excavated space, and prevented the mud on the upper surface, which was very soft, from falling in upon the workmen; In proceeding deeper care was taken to prevent the sinking of the before mentioned frame by its own weight in excavating parts beneath it, till another circle was formed of pieces like the first, called ribs and uprights with boards introduced behind. The distance between these ribs was in the first or upper part of the work about 3 feet, but as frequently as oozings increased they were placed nearer, and in many parts joined each other without any board or uprights, and continued through the whole of the wooden frame against an immense weight of mud, quick-sand, and sea beach, to the depth of 36 feet. The occasion of the circular frames being nearer in some places than in others, arose from the greater or less quantity of salt water that came through the sand, &c., and often rendered it impossible to sink under the frame more than the thickness of one of the ribs without danger of blowing up or of the mud, &c. giving way before such powerful streams of water, and thereby forcing itself into the bottom of the excavation, which in sinking through very wet quicksand, &c., is much to be apprehended, and an accident of that nature would entirely destroy the work.

At the depth of 36 feet the wood work was finished, and 6 feet deeper a firm foundation of hard blue clay was discovered; the several parts of the frame were then strengthened to prevent separation and to resist the immense pressure of mud, quicksand, and loose sea-beach which were supported by it. It must be observed that the salt water, after proceeding thus far, came in very fast through all the joints of the frame, and external boards in which holes were left, on purpose to let the water into the well in different parts that it might not be confined entirely to the bottom of the woodwork, as from the weight upon one part *only* there might have been danger of blowing up;—a circumstance ever to be guarded against with the

utmost caution. The frame being made of sufficient strength, and the workmen able by continual drawing, with four 36 gallon buckets to keep the bottom of the well dry enough to proceed farther, the greatest difficulty seemed to be overcome. The next process was to cut off, or stop out the salt water entirely; to effect which, a smaller circle, was described at the bottom of the excavation, upon the hard clay already mentioned, of the diameter of 8 feet in the clear, or inside of the circle, around which a circular frame of wood was laid, and a brick steening of 2 bricks, or 18 inches thick in Terrace raised gradually to the top of the well, whilst as it proceeded upwards the space between the back of this steening and the wooden frame fixt 6 feet higher, was filled with well tempered clay 4 feet thick, and carefully rammed.—During this operation, and raising the brickwork with the clay behind it, the water continued to run over the whole work into the centre of the well, now reduced from 21 feet 4 inches, to 8 feet diameter, and was constantly drawn out, so as to leave the sides sufficiently dry for the workmen to raise them until they had reached the top, and consequently, as this work was water tight, completely cut off the filtration from the sea, precautions having been taken to prevent the danger of blowing up at the bottom.

The next proceeding appeared more simple, but care was still necessary to avoid damaging the foundation of the work at this stage, as the least crack might have again introduced the salt water; a smaller circle than the last was therefore described, and ribs formed as before, and fixed some feet higher within the brickwork, and others of the same kind sunk to a depth of 8 feet below the bottom, upon which the several works already described rested. From this a course of bricks was carried up within the last mentioned ribs or circles, upon a diameter of 6 feet, whereby they became inclosed, and joined with the first mentioned brickwork, having the clay wall and wooden frame pressing behind them upon large dimensions; in sinking down, small kirbs were, at certain depths, placed to support the steening, which consisted of 2 stretching courses of bricks laid separately, and keyed into the clay, or back part of the brickwork, by rough pieces of stone, flints, &c. to prevent a slipping or lowering of the steening by its own weight.

The work was carried on from this period without any material difficulty, or difference in the clay, except the very extraordinary discovery of a piece of a tree at the depth of 300 feet from the top of the well, until the appearance of water at 328 feet deep, by a small mixture of sand in the clay, with oosing of water from it, and at 330 feet deep, upon boring, the whole bottom of the well blew up, it being with great difficulty the workmen escaped the torrents of water which was mixed with a quick-sand that rose 40 feet from the bottom of the well. The water rose in six hours 189 feet, and in a few days within 8 feet of the top of the well, it has since been carefully analyzed by a chemist, and found perfectly good for every purpose, and it is presumed the quantity will be equal to every demand of public and private use at that place, there having been a constant drawing ever since it was first discovered, and the water has not been lowered more than 200 feet; it is proper to remark that the water is of a very soft quality, and upon being drawn has a degree of warmth un-

usual in common well water. It remains yet to be determined from whence that warmth proceeds; but as it is proved wholesome the circumstance is fortunate for the soldiery of the Garrison, and they will not be so liable to the complaints that are frequent among troops, as often happens at Dover Castle, arising from the use of very cold well water.

The following particulars respecting the castle and well at Queensborough referred to by our correspondent are extracted from "The beauties of England and Wales," a work published by Edward Wedlake Brayley, in 1808, and may prove interesting as connected with the preceding narrative. Until the receipt of our correspondents communication, we had full faith in Mr. Partington's assurance that the priority of invention of this mode of obtaining water was due to Mr. Benjamin Vulliamy of Norlands, who, in 1794, executed very successfully a well on the artesian principle*. Sir Hyde Page's work had, however, preceeded it by about 13 years, and from the extract which we now lay before our readers it will appear that the well at Queensborough had preceded that of Sheerness by 56 years.

"QUEENSBOROUGH WELL.

In the survey of the castle, made by order of the Parliament in the year 1650, it is stated to consist of "12 rooms of one range of buildings below, and of about forty rooms from the first story upward; being circular, and built of stone, with six towers, and certain out houses; the roof being covered with lead; that within the circumference of the castle, was one little round court paved with stone; and in the middle of that, one great well; and without the Castle was one great court surrounding it: both court and castle being surrounded with a great stone wall, and the outside of that moated round, the whole containing upwards of three acres of land." It is also stated that "the whole was much out of repair and no ways defensive of the Commonwealth, or the island on which it stood, being built in the time of bows and arrows; and that as no platform for the planting of cannon could be erected on it, and it having no command of the sea, although near unto it, it was not fit to be kept, but demolished; and that the materials were worth, besides the charge of taking down, £1792 1 2½d;" the Castle was soon afterwards sold and immediately demolished; but the moat that surrounded it, and the well, still remain to point out its site. The latter which had been partly filled up with rubbish, was reopened by order of the Commissioners of the Navy in the year 1725, on account of the scarcity of water that existed at Sheerness, where not any could be obtained for domestic uses, but what was brought from Chatham. On clearing out the well it was found to be nicely steened with Portland stone to the depth of 200 feet, the diameter being 4 feet eight inches. Having fixed a trunk about four feet below that, the workmen commenced boring through a very close blueish clay, and after three days and a half's labour, the augur slipped in at the depth of eighty one feet more, when the water immediately burst up, and kept gradually rising till, on the eighth day, it had attained to the height of 176 feet: the quality was excellent, and it has furnished an abundant supply ever since. It has been computed that the bottom of this Well is 166 feet, and that at Sheerness, upwards of 200 feet, below the deepest part of the adjacent seas."

SCIENTIFIC FOLLIES.

To the Editor of the India Review.

DEAR SIR,

D'Israeli, in his entertaining "Curiosities of Literature," has characterized "the Quadrature of the circle; the Multiplication of the

* See British Cyclopædia: Arts and Sciences.

Cube; the Perpetual Motion: the Philosophical Stone; Magic; and Judicial Astrology," as "the six follies of science." They were *follies*, however, which, "many years ago," when the *Miscellany* named first appeared, might be excusable in the few Quixotic Philosophers of that time, but which (allowing a reasonable reservation in favour of the first three named) we would certainly little anticipate meeting as subjects of study or speculation under the advancement to which learning has attained in the present year of grace 1843.

Astrology, however, despite its incontrovertable refutation furnished by its own inconsistencies, if the successful publication of such Books as Raphael's "Manual," and other works of the like character justify an inference, is still a branch of Science (!) studied and patronized even in enlightened England.

With reference to *Alchemy*, the following article, from a late number of "the Mechanic's Magazine," whilst it bears melancholy evidence against the *nonsense* which it yet remains the duty of *common sense* to explode, may be amusing to at least some few of your many readers :—

"*The days of Alchemy not past.*—A literary journal of the last week contains an advertisement extraordinary, under the head of "Hermetic Philosophy and Chemistry of the ancients," in which a "Professor of long experience and research in both the ancient and modern Chemical Schools," offers, for the small trifle of *two hundred guineas*, to furnish "the philosophical student, or other pupil," "with a proper quantity of the requisite mercurial matter to operate for the profitable application of the hermetic science as *a source of wealth* to the fortunate operator in this mystical branch of metallurgic chemistry, *successfully (?)* practised by Flamel, Lilly, and others, the adepto-chemical philosophers of the middle ages," only "*a few applicants*" are to be let into the making-money-at-will secret, because "the tedious and difficult elaboration of the necessary mercurial agent above mentioned (the Caducean mercury of the ancients) *prevents any but a very sparing dissemination of the matter!*" Whatever the advertiser's hermetic merits may be in other respects, it will not be disputed (says the Editor of the Journal from which I quote) that so far as the humbug of the thing goes, he is a genuine *adept* of the old School."

Were the foregoing not quoted from so respectable a source, we might, naturally, be induced to doubt the probability of its truth; but, how much more improbable it will appear to you and your readers when I state that I am assured, on respectable authority, that "two intelligent European Merchants of Calcutta, some time ago, patronized a Native Alchymist who engaged in *due* course to *produce Gold from Dew-drops!*" These failing, however, *Cow-dung* became the *succedaneum*—and this, in turn, failing, the disappointed philosophers, in despair, closed their coffers, after having been duped out of a sum which I am ashamed to specify. So much for "the wisdom of the fool" when opposed to "the folly of the wise!" These are follies, however, which the scientific Journals of Europe have done—and are doing much to eradicate in that quarter of the world. May your Journal, Dear Sir, as far as its influence can extend, do as much in the service of true Philosophy in the East.

Your's faithfully,

II.

REVIEW.—LOCAL.

Geography and Statistics of Asia.

An important letter appears in the last number of the Calcutta Christian Observer regarding a great work, or rather series of works that are about to be published on this important subject. The writer of the letter is Major Jervis, late of the Bombay Engineers, the projector of the work. We have much pleasure in calling the attention of our readers to the subject, and bespeaking such assistance as they may in their several spheres be able to render to a work that we confidently expect will prove a most valuable acquisition to all classes of the intelligent community. The letter of Major J. details various negociations with booksellers and publishers, the nature and results of which he assigns as reasons for modifying his original proposal, which was put forth about two years ago, in a prospectus, which the writer of the present notice first introduced to the public through the medium of the Christian Observer. The proposal, as it then stood, was to publish a large Encyclopædia of the Geography and Statistics of Asia, and more especially of the British possessions. Regarding this plan we were frequently consulted by Major J. and although we could not propose a better, yet it did not wholly satisfy us. In fact, if we must confess it, Encyclopædias are not much to our liking. The alphabetical arrangement, like every artificial and arbitrary arrangement, has many disadvantages; of which not the least is the necessity of frequent repetition, and of the disproportionate length of articles with reference to the importance of the various subjects,—disadvantages which we think are scarcely compensated by the facility of reference, which the alphabetical arrangement certainly affords above all others. But to our apprehension,—as will appear in the sequel, for we are not going to dismiss this matter with a mere flying notice—to our apprehension the chief desideratum in regard to this matter at present is not a work of reference, but a work of reading; a work which will induce the reading community to attain a far higher standard of knowledge in regard to this great subject than has hitherto been attainable, or than has hitherto been thought necessary for ordinary purposes. One other objection holds against the alphabetic arrangement in a work which requires for its proper accomplishment the energy and enthusiasm of *one* mind; and that is that if that one mind is removed the work is left incomplete. We are therefore very glad that the projector of this work has abandoned the alphabetic plan; and we shall now give in his own words the account of that which he has adopted.

"Instead of proceeding either alphabetically, as proposed by Mr. Ostell, or on plan that at first occurred to me, I have undertaken to give a series of highly interesting and various memoirs, voyages and travels—selected and elegantly translated from the French, Russian, German, Italian, Portuguese, Dutch, and Oriental languages, with occasional reprints of scarce English works and other original matters. These, with good notes and prefatory dissertations, will furnish my countrymen with a large fund of valuable information from quarters perfectly sealed up to the generality of readers; and to the authorities some important matter of immediate consequence to the public interests which otherwise could not be obtained. I propose for instance, in the course of the first year, to publish Count Hilmerson's description of Khiva from the Russian archives at Orenburg,

together with Baron Myndorff's Bokhara, Monrarier's Khiva from the French, and Count Graperg da Hamso's papers on Central Asia from the Italian. These with Baron Humbold's, Gebler's, and Ehrmanus' papers on the Altaic Thianshan will throw some light on the Geography of Central Asia. These are *all ready for the press*—also Baron Hugel's Cashmere from the German; Vincenzo Maria's voyage overland from Rome to India, and back, through Syria, and Persia, by the Mediteranean—from the Italian; Spassky's and Kraschinninni Koff's account of the frontiers of Siberia, China and Tartary from the Russian.

In the course of my publication I hope to devote a separate volume or two to a particular account of the Presidencies of Bombay, Calcutta, Madras, Agra, and Ceylon.—Her Majesty's Government have honoured me by handing me a most curious original map of Pekin, the only one supposed to have ever reached England—to have a few fac-similes struck off for her Majesty's Government—the remainder to be freely available for my Memoirs. I trust therefore the subscribers who honoured me with their names in the first announcement of my Prospectus, will see no reason to abandon me or decline assent to the reduced and modified plan and terms now proposed. The first lithographic specimen I have turned out of my press,—the Island of Bombay—and which in truth procured for me the privilege of adding the name of Victoria to my memoirs, has been pronounced by the most competent judges to be far superior to any thing of the kind in elegance and execution, that has ever appeared in England. Of this I hope to forward many copies by the next Overland mail, and if practicable the first part of the memoirs.—

To cover even necessary expenses, at least 600 subscribers would be required."

These works are to be published on the following terms:—Six volumes to be published each year, each volume to contain from 300 to 400 pages (we think Royal 8vo. though this is not distinctly stated,) and to be illustrated by one or more maps or other designs. The price to be 36 Rupees for the six volumes, payable on the delivery of the first, and under guarantee that the money shall be returned if the book be not forth-coming.

The English are the greatest navigators, and among the greatest travellers in the world, and yet Geography as a science has been more cultivated by the Germans, the French and the Russians than by our countrymen. Why is this? Is it that we in the pride of our naval and military prowess, entertain something like a contempt for the mere description of the peculiarities of countries, and leave *that* to be done by those who can *only* describe them? The supposition is not very creditable to the philosophic spirit of the countrymen of Bacon and Newton, no less than of Cook, and Anson, and Byron, and Park, and Parry and the Rosses; and yet we know not how else to account for the fact. Where is the land that British feet have not trodden? Where is the sea that British keels have not ploughed? Where the mountains that Britons have not climbed? The valleys they have not surveyed? The rivers they have not measured? and yet where is the great literary and scientific geographical work, worthy of the nation whose sons have been the greatest discoverers, and the greatest colonizers, not to say the greatest conquerors, in the world? We do not know any English work worthy to take rank with the works of Malte Brun and Balbi, and we are told that these works are far exceeded by those of other continental writers. We believe it impossible that this state of things can continue. England is clearly destined of heaven to have power and influence over the earth; but the Father of her science has said that "knowledge is power," and therefore England must get knowledge of the world. Her people must get more extensive and more accurate and detailed knowledge of all the

peculiarities of all the regions that men inhabit or can inhabit, and of the men that do inhabit them, for in the hands of her people are her government, her commerce, her enterprise, her philanthrophy,—in a word her power ; and this power must be directed and encreased by knowledge ; and come that knowledge how or whence it may, come it must and certainly will. We deny not that there is diffused among the people of Britain a great amount of school-learnt geography, but this is not high enough in degree for the people of Great Britain, even if it were better in kind than we fear much of it is.

A great work on the Geography of Asia will be a great boon to the English people. Country after country is falling under our influence and our power ; the inscrutable purposes of heaven seem to be linking the destinies of Asia with those of Britain in a mysterious, we had almost said, a miraculous way ; and these destinies must, in subordination to those inscrutable purposes, bear a close relation to the knowledge possessed by the people of England. A few years ago the influence of England over Asia seemed a miracle, and then China was shut up from that influence as if by a barrier of eternal ice, while Affghanistan was supposed to be not only not for her but against her. Now China has sent ship-loads of silver to her as a peace offering ; Affghanistan has learned not to seek her hostility ; and now again Scindia has fallen, as if by a fresh miracle, into her unseeking hands. The hundreds of millions of human beings who have thus been brought to a greater or less extent under the influence of Britain will experience that influence to be a blessing or a curse, according as it is exercised under the direction of accurate and detailed knowledge of their state, and that of the countries in which they dwell, or under the direction of apathetic indifference, or of indiscriminating zeal.

After what we have said we need scarcely say that we understand Geography, as the projector of this work doubtless understands it, in the most liberal sense, not as implying merely that amount of knowledge which is to be derived from a table of latitudes and longitudes, but as embracing all that appertains to the past and present condition of the earth as the dwelling place of man. But even in the most narrow and confined sense of the term the Geography of Asia is deeply interesting and important. So strange has been the history of many of its nations, so often has it been over-run by successive conquerors, that even the places of the great cities of other days is now matter for conjecture and interesting discussion. But when we consider geography according to the more expansive character that we have given to it, that of Asia becomes profoundly and overwhelmingly interesting. To Geologists it is almost unknown ; and how may it confirm, or modify or destroy some of their favorite theories when it has been examined with half the care that has been bestowed upon Europe. The antiquary, the archaeologist and the philologer know little more regarding their several departments than that there is a vast amount of knowledge in store for their successors. The student of history knows that there must be much of great interest yet undiscovered in regard to the achievements of the great men who have subdued such vast territories by their arms, and those sages whose wisdom real or reputed has won respect for their names.

He who looks upon man as his brother, and feels a community of nature with man, wherever and whenever he may exist, desires far more knowledge than he has yet obtained regarding the people of Siberia and Tartary, and China and Thibet, and Burmah, aye, and even of India and Persia and Arabia and Turkey and Georgia and Circassia ; not, to speak of the Sheiks and the Nepaulese and the Belooches and the Khivans ; while the Christian, whether he look to the past or the future ; whether he think of what we may be permitted to call the philosophy, or whether to the poetry of religion ; whether he study his own true and divine system, or those delusions that have long imposed upon blinded millions, feels that a more intimate, a more minute, a more inwrought knowledge of the geography of Asia would be an unspeakable benefit to him. For is it not the quarter of the world where the principal events occurred which are the foundation of his faith ? It was there that the founders of our race basked in the rays of the divine blessing,—there that they still sojourned after the cloud had shut out these beatific beams from their souls ; there that the ray of mercy broke through the cloud and cleared their darkened minds. There too did the antediluvian race dwell until the measure of their iniquity was filled up. There was built that mysterious ark, the ancestorial mansion of all the nations of the earth ; there Noah received from the dove the emblematic olive branch, and there he gazed on the significant bow of God in the cloud. There for the most part lived the patriarchs, Abraham, Isaac and Jacob, and there, to converse with these and others, oft descended messengers from heaven, rendering the whole continent a hallowed and sacred land. There was the land which God chose for His own, that land flowing with milk and honey in which His peculiar people were His sojourners. There did Samuel prophecy,—there did David and Solomon reign, and there were exhibited countless manifestations of the faithfulness and long-suffering and mercy of the God of Israel. There did a long train of prophets drink inspiration from on high, and in strains of rapture sang of the better and brighter days that await the world when the law shall go forth out of Zion and the word of God from Jerusalem. And there in the fulness of time appeared the incarnate eternal word himself.—

Over *those* acres trode HIS blessed feet.

He was himself, according to the flesh, an Asiatic ; his associates and intimates, as well as his persecutors and murderers, were all Asiatics. Here the first triumphs of his gospel were achieved. Here thousands in a day fell prostrate before his cross. Here were Antioch, and the seven churches addressed in the apocalyptic letters, and Palmyra, whose mysteriously virtuous Queen, all allowance being made for exaggeration, commands our admiring veneration. And turning from the past to the future, it is unquestionably in Asia that the most glorious displays of the wisdom of God and the power of God unto salvation are yet to be made. The gospel of salvation has yet to abolish and cast out both Brahminism and Buddhism, and the paganism and the irreligionism of China ; and to destroy and bring to an end the delusion of the Arabic impostor. In short, if we wish to study accurately the *history* of our holy faith ;—if we wish to have a clear

view of the fulfilment of its *prophecies* ;—if we would enter into the spirit of its *poetry* ;—If we would trace to their source most of the *corruptions* by which it has been *vitiated* ;—if we would find an arena for the *future* display of its saving efficacy, a vast channel for the breaking forth of the the long pent up energies of its philanthrophy ;—we must know the geography of Asia, not merely in the general, but with accuracy and minuteness, else our wishes will be disappointed at every step.

The work that Major Jervis has undertaken is a very great as well as a very important one. We have great confidence in his success. It is quite the sort of work that requires for its right accomplishment that concentration of effort and determination to succeed which some men call momonania and others call genius ; but which, by whatever name it may be called, is indispensable for the success of any great undertaking. Now Major Jervis is determined to succeed, and he will spare no efforts to ensure success.

We conclude by strongly recommending the work to the support of our friends.

Transactions of the Agri-Horticultural Society of Western India.

Quarterly issue, April, 1843.

"The periodical publication of reports of its proceedings, and of the papers forwarded to it on subjects of Agriculture, Rural Economy, or Gardening, or any other matter coming within the scope of its institution, was a leading object amongst the projects the Agri-Horticultural Society of Western India had in view at the period of its original establishment."

The design thus enunciated in the brief preface to the present issue and which we elsewhere learn formed one of the Resolutions at the formation of the Society in 1830, although frequently under consideration, appears to have been delayed by various causes until the year 1838, when the first number appeared under the editorship of Dr. Smytton, prefaced by Dr. Kennedy. A period of nearly 4 years was suffered to pass away before any farther attempt was made to follow up the design, not, however, from any deficiency of material, for, in 1842, the Committee of Papers, on examining the archives of the Society, found valuable matter enough to fill annual reports for the four years succeeding the publication of the first number in 1838.

The high estimated cost of printing, and "*the badness*," so says the report, of the execution of all typographical operations in Bombay, had determined the Society to prefer the press of Edinburgh, but, as it now appears, with so little of the anticipated advantage, so far as facility of publication was concerned, that after much delay and many disappointments it has at length been found expedient to abandon for the future all idea of home printing. On this head we conceive that there can be but little to regret. The delay of sending to Europe, maugre the increasing facilities of communication can be but slightly overbalanced by the superiority of typographical execution, and if we may judge by the general appearance, arrangement and style of the

number before us, even that advantage must be slight indeed: either there has been a most decided improvement in the Bombay press generally during the last twelve months, or a very particular exception is to be found of which the "Times gives proof."

It is now proposed to publish the Transactions quarterly, the present number being the first of the series. Besides the original matter in the hands of the Society, it is intended to include such selections from other works as, from their nature, may be calculated to forward the views and objects of the association.

It is highly creditable to the feeling of the Society that the first article in the report of their proceedings for the year ending February, 1842, is an honorable testimony to the worth and talent of their departed Secretary Dr. Heddle, whose death took place in March of that year. At a meeting conjointly of the members of this Society and the "Geographical Society of Bombay," it was proposed by Colonel Dickenson and unanimously resolved

"That, to mark the deep sense of the loss which the Geographical Society of Bombay, and the Agricultural and Horticultural Society of Western India have sustained by the premature death of Doctor Heddle, to whose superior acquirements, enlightened views, and unwearied exertions in furtherance of their important objects, these Institutions in a great measure owe their original formation, and the reputation and success which have hitherto attended them; a subscription be entered into for the erection of a Tablet in the Cathedral or Byculla Church, with an Inscription commemorative of their respect for his memory, and their feelings of gratitude for the important services rendered by him in the cause of Geographical discovery, and for the extension of Agricultural improvement in India; and that 150 Rs. be contributed out of the Funds of each society towards this object.

Twelve hundred and fifty rupees, including the Societies' subscriptions, were set down in the room, and the sum on the list when closed a few weeks afterwards, amounted to Rs. 2,530. A committee, consisting of Dr. Morehead, Lieutenant Suart, Cursetjee Jamsetjee, and the Secretary, was appointed to carry into effect the wishes of the Society. Plans had been written for and sent out from England, but these having failed to meet the wishes of the committee, a fresh correspondence for suitable plans and information was expected immediately to be concluded, when the views of the Society would, without delay, be carried into effect. The business of the Society having been carried on for a time by the native secretary—Cursetjee Jamsetjee, Esq., Mr. Buist was elected in room of Dr. Heddle on the 8th April."

Of the financial prosperity of the Society the following comparative statement and the paragraph which follows it present a very satisfactory account :—

	AMOUNT OF SEEDS SOLD.	PLANTS SOLD.	AMOUNT OF DONATIONS.
For the year 1840*	Rs. 377 1 25	Rs.... 388 1 37	.... Rs. 1695
do... 1841...	„ 699 2 20	...... 706 1 17	 1485
do... 1842...	„ 690 2 25	...... 488 1 50	 1025
do... 1843†	No return. (up to 1st Feb.)	58 0 25	 1250

The payments made by regular subscribers for the year 1842, amounted to Rs. 1,735—this included certain arrears of payment. The number of regular paying subscribers at present on the list, amounted to exactly 100, so that the income from this source is estimated at Rs. 1,500; the grant of Rs. 250 monthly by Government amounted to Rs. 3,000; the amount from donations to at least

* First year when donations were obtained.

† The amount of donations for 1843, is up to this day; and the Book is still in circulation.

Rs. 1,500, from seeds and plants probably Rs. 700—so that the gross estimated funds which will be at the disposal of the Society for the year 1843, will amount in all to nearly Rs. 8,000, besides the Government prize grant of Rs. 5,000 devoted exclusively for cultivation: so that, although our revenues are small in comparison to those of more extended institutions in the adjoining Presidencies, considering that, beyond the rank of the head gardener, whose pay and allowances will not exceed Rs. 1,200 a-year, we have no paid officers, and that the most rigid economy is enforced in every department, a vast amount of benefit may, with this sum judiciously applied, be expected to accrue. During the past year, the number of members added to the Society's list has been small, consisting of the Lord Bishop, Captain Stanton, W. Baxter, Esq., and Richard Willis, Esq., &c. &c."

The Society have bestowed considerable attention in the establishment of their garden, an object which we heartily commend to the notice of Societies of this nature generally: under proper management they may be made, we conceive, highly conducive to the advancement of Horticultural science. The collateral advantage, as in the case before us, may form no mean item in the yearly audit of ways and means as the preceding statement we think will pretty clearly shew.

An experienced Gardener from the "Caledonian Horticultural Society's" Gardens, Edinburgh, has been engaged, and is now in charge of the Gardens.

The usual modes of obtaining seeds, either from the Cape, always dear, and not always good, or from England, viâ the Cape, by which latter mode they were generally destroyed during the voyage, having occasioned many failures, it has been determined that hereafter the necessary supplies shall be received over-land by which means it is expected, when the new arrangements for transit through Egypt are completed, the freighting charges will be very moderate or greatly reduced from their present rate, which is estimated at 4 shillings a lb.

The report states that one sample only of silk was produced at the meeting by Mr. James, of which he had grown 40 lbs. The worms were reared from the leaves of Mulberry hedges not 7 months old. With reference to this specimen

"It was agreed that a silver medal should be awarded to Mr. James in consideration of the great industry and perseverance he had displayed, and without reference to the quality of the silk. Dr. Gibson remarked, that it was not very encouraging that this should have been the fourteenth or fifteenth year that they had been in the habit of giving prizes for specimens, and that, as yet, nothing but specimens had been produced. The cost of production of all the silk which had as yet been reported on, was more than ten times its value How long were they to go on in this way?—endeavouring to foster a species of produce which offered so few hopes of ever becoming a profitable, or even a paying, or a promising object of culture!"

We are gratified to observe that attention is directed to this, in our opinion, very important point. It has often struck us as a remarkable feature in societies of this nature, generally, that whilst they have very properly held out ample encouragement to cultivators of specimens and to experimentalists, they have not, as far as we can perceive or learn, hitherto adopted measures sufficiently calculated to stimulate and promote exertions on a more extended scale. In another instance recorded in the Report, the Society awarded a prize to the exhibitor of a fine specimen of Sugar Candy on the understanding that he had himself raised at the least 2 maunds. This is wisely ordered, why not extend the principle? Would it not be productive of more good

to award prizes for the successful and approved cultivation of any certain fixed portion of land which the society might determine upon, as the test of ability, skill, and knowledge, than to confine its favours and rewards to the mere exhibition of a fine specimen. Such a course might we opine tend greatly to promote habits of industry and perservance amongst the native cultivators either of foreign or indigenous productions and equally subserve the ultimate objects and views of the society.

We extract from the transactions the following valuable memoranda furnished by Mr. Elphinstone of Rutnagharrie whose indefatigable and zealous labours are beyond all praise. They relate to the cultivation of Sea Island and Bourbon Cotton, a subject on which we have in a former number of the 'Review' taken occasion to offer a few remarks:—

"*The mode of Cultivating Sea-Island Cotton.*

1st. The ground having been previously ploughed two or three times to the depth of, at least, one foot, and levelled with the board, the rows for sowing the seed are marked out with the line, and formed three feet apart, and a few seeds are, at the commencement of the rains, sown together in spots two feet distant from each other in the row, and when the plants are about a span or six inches in height, the most vigorous of each group should be left, and the remainder uprooted and thrown away. When the plants have attained nearly a foot in height, they will derive benefit from having the earth raised up on both sides of their roots, and when they have reached about two feet in height, a small piece from the head of the topmost shoot should be twisted off; and if, after some time, the plants still merely grow upwards, without sending forth spreading branches, they must be topped by having the upper shoots broken or cut off, which will cause the plants to branch and bear more cotton.

2d. If it be desired to continue the cultivation of the same plants the second year, they must be cut down one-fourth of their height, leaving three-quarters of the plant standing. But, in order to ensure a good crop, it would be preferable to sow the seed anew, rather than continue the same bushes the second year; because, though the plants will still bear, yet, except in very favourable soil, their powers of vegetation and fructification seem somewhat exhausted in the second year of their existence. In America they are merely annuals.

3d. Irrigation is not essential in the cultivation of the Sea-Island Cotton plants, unless it were intended to sow the seed at any other time than the commencement of the rains.

4th. The soil best adapted for its cultivation appears to be the alluvial land at the mouths of rivers. The black soil is not necessary for it; it will grow on any good land, but in sandy soil it is soon scorched up after the rains are over. The air in the vicinity of the sea is supposed favourable to the plant.

A description of the Bourbon Cotton.

1st. The plants of this species of cotton are perennials, lasting a great many years, and when they attain their full size are about 10 feet high, and measure upwards of 10 feet across; they are then very productive, and yield a valuable cotton. It is distinguished from the indigenous cotton of India by having black seed, which, from being less adhesive to the cotton than the country seed, is more easily separated from it.

A description of the kind of land suited for the cultivation of Bourbon Cotton.

2d. The black Indian cotton soil is not necessary for this cultivation; it will grow on reddish or yellowish clay soil of good quality. It does not suffer from wet during the monsoon, if water remains around the roots of the plants for only eight or ten days at a time, but would probably be killed if it were to lie there for a month. It is therefore desirable that furrows should be made to lead off the water, and the field should not be in too low a situation, where the water is constantly rising up to the surface, as in rice fields.

The mode of preparing the field.

3d. By the beginning of the monsoon the field should be ready ploughed two or three times, to the depth of one cubit, and the soil be well loosened and pulverized to admit of the roots penetrating beneath; and finally, the field ought to be finished off by being levelled with the board.

One mode of cultivation by transplantation.

4th. By sowing the seed one or two months before the monsoon, in ground which can be watered from a well, and carefully transplanting the seedlings at the commencement of the rains into the field where they are to stand, at the distance mentioned in para. 5, the first year's crop would probably be increased and the plants would be better enabled to withstand the droughts of the succeeding hot season, without the necessity of recourse to irrigation; but, probably, this mode of cultivation would be attended with too much extra labour and expense to be suitable to poor cultivators, and therefore it would suit them better to sow the seed in the field in the usual manner at the commencement of the monsoon.

The general mode of cultivation to be adopted, if preferred to that described in para. 4.

5th. After the land has been prepared in the manner described in the 3d para., the seed should be sown either immediately before, or at the commencement of the monsoon, in rows one foot and a half apart; and to ensure greater regularity in the distances and the straightness of the rows, they may be marked out by the cord, and two or three seeds should be deposited in the ground together at spots 1½ feet distant from the other in the row. If manure is supplied to the field, a handful of it may be deposited at each spot when the seeds are sown, which will make the seedlings sprout more vigorously. If the seed should appear old, a larger quantity than that above specified should be sown in each spot. By following the above directions a group of plants will rise up at 1½ feet distance from each other. When the plants are about one span in height they must be thinned out, leaving at each spot only the most promising of each group to stand for the crop; at the same time the field should be carefully weeded.

The distance at which the plants should stand from each other during the first year.

6th. By the plants being too much crowded and shaded from the sun, they will be less productive. Towards the end of the monsoon the distances at which the plant will stand from each other, according to the above instructions, (viz., one foot and a half apart) will, on good ground, be found too close, and will require thinning out to the extent of drawing out each alternate row, as well, perhaps, as each alternate plant in the row, by which the plants will remain three feet apart each way. Positive instructions on this head cannot be given, because the course to be followed must depend on the quality of the soil, and the consequent vigour or size of the plants. The plants that are uprooted, if burnt to ashes, will form good manure for those that are left.

Description of the first year's crop.

7th. The plants will flower at the end of the monsoon, and yield their cotton during the cold weather, before the indigenous cotton. The Bourbon variety of cotton plant being a perennial, it does not come to perfection within the first year; the plants are then small, and the crop less productive than afterwards, and consequently the profit to the cultivator is less than in succeeding years.

The management of the field during the second year.

8th. At the commencement of the rains of the second season, the plants will be found standing in the row either at one and a half, or three feet apart. The former will now be decidedly too near, and it will be requisite that they should at least stand three feet apart in the row. It will also be necessary to uproot every alternate row of plants, which will make the rows six feet apart from each other; and if the plants should still be found crowded, it may be necessary to take up every other plant in the row, which would leave them six feet from each

other each way. Should any of the plants have died off during the preceding hot season, it will now be necessary to supply the vacancies created by them, by sowing fresh seed, to raise plants at the regulated distances.

Another mode of cultivation, by allowing a greater space for the plants, where the soil of the field may be of very superior quality.

9th. In land of the best quality, the seed may be sown at the commencement of the rains, two apart in the row, making each row four feet distant from the next. If, towards the close of the monsoon, the plants should be found too close to each other, every alternate plant may be thinned out in the row, so as to leave them four feet distant each way. At the commencement of the rains of the second year, it will probably be found necessary to uproot every alternate row, which will leave the rows eight feet distant from each other. If, after this, the plants should still be found too crowded, it may be necessary to take up every other plant in the row which will leave the remainder a space of eight feet each way. If the field is continued for several years, it may become necessary to add a little manure to the roots of the plants.

The management of pruning the cotton field in subsequent years.

10th. "If, after a few years, the cotton trees become less productive, it may be advantageous to cut the old and dry wood, leaving the green: and if, after this, the produce should still be found much diminished, it would be as well to cut down the cotton trees to one half their height, which would cause many new branches, productive of blossoms, to sprout out. If a continuance of this treatment every other year does not render the plants as productive as may be reasonably expected, it would finally be desirable, at the commencement of the rains, to sow the seed afresh between the rows at four feet apart, and in the following year to uproot all the old plants; and if, at the distance of four feet, the young plants in the second year of the growth have not sufficient room to expand, it might be necessary to increase the distance between the young plants each way to eight feet asunder. By adopting this method, the land which the old plants had exhausted would be left to recover itself, and the young plants would obtain a fresh soil in the same cotton field: and by this succession of young plants in substitution of the old, the field would not require to lie fallow; neither would there be any interval of time lost in the succession of a full crop for a diminished one."

From the article which follows that just quoted, we learn that during the month of July 1841, 71 Ryots had planted in the Deccan 8548 Mulberry trees, and 13,560 feet of Mulberry hedging. To this statement Mr. Mutti, superintendant of Silk Culture at Kassimbeck, Wargaon, has appended the following remarks which we present as we find them being assured that our readers will readily accept the apology offered on behalf of Mr. Mutti, whose letters, he being a foreigner, contain a few idiomatic phrases.

"REMARKS.—SILK-WORMS.—Last February I procured Silk-Worms' eggs from Egypt: the result of the experiments with these in Bombay has not been favourable; the failure may be attributed to the great heat that prevailed there. A portion of the worms died, and the survivors made but poor Cocoons.

At Kassimbeck Wargaon, however, have been more lucky; very few worms died, and the Cocoons were tolerably good.

I made a cross breed with mine: I gave an Egyptian male Moth to my female. The experiment answered capitally. I had the satisfaction to see the eggs hatching the ninth day; the worms (of a very large size) to spin in only twenty days, and to make so fine cocoons that I have never seen their equal in this country. They weighed

7 to a tolah, chosing;
8 to a tolah in lump;

five days after having spun the worms, and before to be backet. The 9th day the moth pierced the cocoon and issued: crossed again the male moth: but *of the new* Egyptian *cross-breed* with the original female, and the eggs hatch-

ed at the same period, nine days; now, again, in twenty-eight days, the worms began to spin. It appears that this worm became a monthly-one; which is not the case of the original. This Egyptian cross-breed is a very great improvement indeed for this country. In fact, I say in my Guide, that the weight of my best cocoons has been for 5000 Rs. five (of 80 tolahs) the Puka seer. Those of the Egyptian *cr. br.* 2800 or 3200, are sufficient. Besides that, there are also other very great advantages, viz. the whole of the worms go to spin by themselves on the bundles placed within the circumference, and the centre of the baskets, without the necessity of being lifted. This saves wages of people, expense for the chakars, and avoids several other inconveniences which I mentioned in my Guide.

This worm does not consume more leaves than ours; it changes its skin four times.

I counted the eggs of 30 months separately, and found that each of them lay from 416 to 436, 447 to 472.

The Cocoons have less gloss than ours. In reeling them the thread runs very easy and does not break; and finally, the consumption from a few cocoons, that I reeled, corresponded to 7840 for one Puka seer (of 80 tolahs) of fine silk.

I have sent cocoons and eggs to Mahim and Naigao, near Bombay; Poonah, Nuggur, Kunnur, Kaira, Madras, and Bengal.

(Signed) G. MUTTI,

Supt. Silk Culture."

After detailing the number of Mulberry trees, nearly 30,000, planted in various places, with a brief tabulated statement of the results, Mr. Mutti farther remarks :—

"1. Besides the mulberry tree plantations detailed in the preceding memorandum—there is a quantity of hedges in almost all the villages, fromwhich hereafter we shall make up a considerable addition of trees. They will not furnish first-rate plants, but still will supply a greater and better quantity of leaves, and require less irrigation.

2. There are also other mulberry tree plantations, which I have been obliged to neglect for reasons which shall appear hereafter.

3. Again, other mulberry trees exist which have been planted by different individuals without my direct assistance.

4. It is well known that the Ryots not only of this, but all other countries, are difficult people to content—they always complain of one thing or another; however, in this mulberry tree cultivation, it is very gratifying to see the contrary. This of course, is to be ascribed to their increased knowledge of the benefit to be derived from it, and its peculiarities.

5. The mulberry tree cultivators possess advantages which, I am happy to say. are duly appreciated by the Ryots*, of these the erect growth and scanty shade are not the least. They are enabled to produce between the trees their vegetables, grain, tobacco, and even plantins and lime trees; and we see now numbers of places that are cultivating in the same spot three products at once, without producing injury to either of them; and this circumstance is of the highest importance and influence for the Ryots. The mulberry tree does not require to be watched day and night :—the weeding manure, and water which supplies the vegetables, &c., throughout the year, is beyond what it requires; the mulberry tree should be planted separately (which, however, is very seldom the case) : the tree requires very little water—the cultivation itself is attended with almost no labour, and as to the expense, having their own bullocks and implements, is free from it. Should also a scanty fall of rain occur in the year the trees are placed in no danger, nor will there be fault of leaves. The St. Helena trees, which are now young, require little water, and bear leaves throughout the year.

6. It should be considered also that the Ryots have steadily pursued the planting of the mulberry tree in the teeth of the prospects held out to them of immediate pecuniary aid, and comparatively advantageous return within the year by the cultivation of the mulberry bush and sugar cane, and even under the circumstances of the advantages of the mulberry tree being depreciated as an undertaking which rendered years necessary before any adequate return could be hoped for. The tree, moreover, does not offer advances of money, nor agreement to

take the product. Notwithstanding these very important circumstances, the applications for the plantation of the standard mulberry tree are numerous, and we see people sinking wells, preparing and levelling waste land, with their own money, to plant mulberry trees. This, I hope, fully confirms again what I have always stated,—that in the quiet prosecution of the plans I have laid down consisted the improvement of this peculiar country, and that the capital was not the centre and life of improvements. The desideratum to ameliorate this country is persuasion, patience, and perseverance, in teaching the natives to open their eyes to their own interest, and to stir up a spirit of competition and emulation.

7. I continue to adopt the cultivation of the St. Helena mulberry species, which I consider a very great and interesting discovery for this country for its quick growth, continual vegetation, quantity of leaves, and less water and labour required. In the meanwhile I have not forgotten the "Shah Toot," of the large leaf resembling that of the fig. In my Guide I have stated in respect to it, that it becomes a very large tree, and supplies a very great quantity of leaves. My opinion is still favourable to it, but cannot answer for immediate purpose, it requiring a long time to come to maturity.

8. I continued my experiments with fourteen mulberry varieties for years, but without effect.

9. I consider the leaf of the "moris alba," white mulberry, with the small white fruit, superior to any other, but its vegetating only one part of the year. The St. Helena and the "Shah" decidedly bear the palm.

10. Two establishments are kept by me, and I rear silk worms all the year round at Wargaon, Kassimbeck, and Narragaon. These places afford great advantages, and without any expense to Government (I cannot say and to myself) which on the contrary gets gratis all the mulberry slips that are furnished to the Ryots. The leaves of the trees pruned are purchased by my assistant, Setwa Goongul, at one and a half pice the pucka seer, so that the Ryots get something. In the meanwhile Brahmin, Pardeesher, Malee, and Koonbee castes are employed and learn all the silk culture processes. Silk worm eggs are supplied to this presidency, Bengal, and Madras gratis: both places are often visited by numbers of natives, and the silk culture becomes familiar to them: from Yewlah and Samgamnier people come to purchase silk.

11. Further experiments have shown that in the Deckan, even during the hot weather, the worms thrive also well and produce fine cocoons, provided that the place where they are reared is exposed to ventilation.

12. As the demand for the mulberry tree is increasing, in order of saving the Government money, for the plants that are furnished gratis, I made an extensive nursery of slips and seed, and charge Government 1 Rupee the 100 plants, instead of two that we pay to the Ryots when we purchase from them.

13. Government has granted Rupees 1000 for building two places for nursery worms: I have not effected, and hope to avoid this expense.

14. Of all the evils which tend to obstruct the advancement of improvement, that which arises from a difference of opinion in respect to the plans that should be pursued in any undertaking, is the greatest, and which, if they do not altogether upset or retard the progress of improvement, tend very much to create confusion and a feeling of distrust in those who feel disposed to engage in the undertaking: and this, when the peculiar susceptibility of the native character is taken into consideration, should be viewed as a matter of much regret. Such, indeed, have been the chances to which the silk culture has been subjected for many years, and it is to this day.

15. In fact, some were of opinion that nothing could be done without the establishment in various places of experimental gardens; the grant of land, rent free, for planting mulberries; and advance of money to the Ryots by Government or capitalists. Some again supposed that nothing could be effected without the settlement of capitals in the undertaking, and the display of European workmanship and skill: others, that the mulberry could not succeed in this country as a standard tree—that the mulberry bush system was to be adopted, being the best one—that the "Philippinah" species was the best,—and the St. Helena, which from its superiority is incomparable, was not good. Some on the other hand, assumed on the grounds of their knowledge of the native character, that the natives would never be able to wind silk—that those of the higher casts will have nothing to do with its cultivation at all—that in Bombay the mulberry, worms, and silk could not succeed—and to render bad worse, some had ventured to propagate the extraordinary opinion, that the Ryots could not afford to rear the

mulberry as a tree—there was no place in the Deckan, nor any quantity of good soil, for the cultivation of the mulberry tree—that the trees would interfere with inferior cultivations, and that the bush should be adopted*.

16. Notwithstanding such a variety of conflicting opinions, the settlement of the sugar and bush undertaking—the scanty support given to the *Tree* Silk Culture Establishment—the obstacles and other contrarities all turned out the reverse of the general opinion; and time, I will venture to assert, will yet more fully develope the great utility and success of this undertaking. Let it be finally considered—that it is only two years and a-half since the Ryots have begun to plant not trees, but the first mulberry slip and seed in nursery."

The Collector of Poona in a letter to the Revenue Commissioner referring to Mr. Mutti's experiments and operations says :—

"Satisfactory as this result is, the great anxiety evinced by the people to possess the worms in order to produce cocoons, is equally so, and I think it may fairly be admitted, that nearly all prejudice on the part of the Brahmins towards the manufacture of silk has been overcome, when it is found that they are perfectly ready to wind the silk from the cocoons, which process can only be executed by immersing the cocoons in boiling water, thus depriving the grub within the cocoon of life. I have myself seen many Brahmins thus employed, and ready to engage themselves in rearing worms and winding silk in their own houses, and on their own account; and, if it were not that Mr. Mutti considers it advisable for the present to confine the attempts of the people to planting trees and rearing the worms to form cocoons, many more Brahmins would be employed in winding silk, although it involves the destruction of the life of an insect, which is utterly at variance with the precepts and tenets of their religion."

From an interesting paper, by Mr. Charles Masson, on the Raw-Silk of Cabool, we extract the following particulars :—

"*Memorandum on the Raw Silk of Cabool by Charles Masson.*

Raw Silk is at present somewhat extensively prepared in Cabool and its dependent districts, both for the supply of manufactures introduced within the last few years from Herat, and for exportation to Peshawur and the Punjaub.

The Silk-worm is an object of attention with the Juanshir part of the population of Cabool, amounting to nearly, or quite, one-half—with the inhabitants of Koh Daman and Kohistan,—with the Safi population at Taghow,—and with the Khogiani tribes under the Safed Koh mountains in the valley of Jellalabad. It is probable, also, with the people of Lughman and Khonar.

Although incompetent to speak as to the probable quantity of Raw Silk annually produced in Cabool and its dependencies, it is not inconsiderable, as from Taghow alone, in 1835, twenty-three kharwars of cocoons paid duties of admission at the custom-house of the city.

It may be noted that the whole of the countries to the north and west of Cabool produce Silk, which is received there from Khokan, Bokhara, Balkh, Khulm, Kunduz, and Herat. Such Silk bears the name of the towns from which it is

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* The bush, when compared with the tree, repeated experiments have shown, gives a much less amount of leaves than the former; and more so that here they intend to use its leaves only three times a year: therefore it is evident that, to obtain a moderate quantity of leaves, it will require that a considerable extent of land should be planted with bushes, and good soil. At Narrangaon we have seen some bushes which looked very poor, and the leaves quite yellow. In remarking it to the Ryots, they said it proceeded from there having been vegetables between them; that it was necessary to have the bush separate from all other cultivation, and clear of grass, which affected it, in order that the great quantity of slips so closely planted together (a few *inches* from each other, and not like the trees, 6, 8, 10, 12, 14, 16, and 18 feet distance), and of course the great number of roots in the surface of the ground (which it is not the case of the tree being planted distant and dug holes to plant it from 1½ to 3 *feet* deep) injured both the bush and the vegetables. No plough could be used even with two bullocks, and the labour was great.

received, and is both used in the country and re-exported to the east. Of Foreign Silks, those of Herat and K[illegible]m are most esteemed, but they are still judged inferior to those of native growth.

The Silk manufactures of Cabool, although recently established, employ nearly one hundred looms, and yield, in direct taxation, about Rs. 5,000 to the Government. The fabrics are coarse, and confined to three or four varieties, yet do not obviate the necessity of farther supplies from abroad. The manufacturers are perhaps entirely Juanshires, and are their own throwsters and dyers.

* * * * *

The quantity of mulberry trees cultivated in the country exceeds that of any other tree, and the varieties are most numerous; yet they are not planted expressly for the sustenance of the Silk-worm, leaves being plucked for them from young trees of two and three years growth, or from the new shoots of more aged trees.

It is possible that the mode of tending the worms, even if not altogether injudicious, might be improved. In the valley of Jellalabad, they are placed amid mulberry leaves, in backets piled upon each other, but without much apparent care; yet, in the city of Cabool, dark rooms are often set apart for them, provided with small apertures for the admission of light and air,—and it is asserted that at particular seasons, a difference in temperature is essential to them.

The Juanshire population of Cabool, settled since the invasion of Nadir Shah, may be supposed more scientific in their management of worms than the Tajik and Affghan natives of the country, as they brought with them the knowledge already possessed in the Silk countries of Persia, while the latter follow the practice of antiquity, whatever be its value. Many of the Juanshires derive from the Silk-worm their sole means of livelihood; amongst Affghans and Tajik the females of families are generally employed in its care, and then only as a secondary object as regards livelihood.

The people of the country also sell their cocoons in the city, where the operation of reeling is exclusively carried on. Whatever may be the efficiency of this process, it may easily be supposed capable of improvment, and to this end must European intelligence be directed if it be judged desirable to introduce the Raw Silk of Cabool into the European markets.

* * * *

Raw Silk, more perhaps than any other commodity, depends upon its preparation for its value to the manufacturer and consumer. Care bestowed upon this point will certainly be repaid, and a plan to improve it, in a country where it already flourishes, can scarcely be called a speculation,—for if due knowledge be brought into play, and honestly made use of, it must be rewarded by success.

To place this fact in a stronger point of view, the Naples Royal Filature Raw Silk may be instanced. Many years ago, the Raw Silks brought into England from Naples, although of the most beautiful colour and quality, were so foul as to be barely saleable, and then at the lowest prices. A general conviction, however, prevailed, that Silk possessing such obvious proofs of being of a good kind, needed only attention in its preparation to become a superior article, and the Naples Government was induced to form filatures or reeling establishments. The result was, a Silk which is now amongst the highest priced and most esteemed of the Raw Silks imported into England.

Colour and quality are but secondary considerations in determining the value of Silk,—and this will be manifest, if it be considered that colour will be changed in the dyeing, and that quality will not ensure its working with facility. For the latter purpose, which the manufacturer principally looks to, cleanness and evenness of thread are essential, and these are acquired by skill in the winding off from the cocoon. Combined with cleanness and evenness of thread, colour and quality are still desirable, being inherent evidences that Silk is of a good kind, but no Silk can be good for the manufacturer that is not clean, and it is better that it should be clean without colour and quality, than that it should be foul with them.

The best Raw Silks brought to England are from the Milanese and Piedmont, and they are so clean, that a certain quantity, say a hank or skein, will break only three or four times during its conversion to Thrown or Organzine Silk. A similar quantity of the best Bengal Silk will break thirty to thirty-five times. As each breakage causes the machinery to be stopped, an idea may be formed of the superior value of clean silk, and conversely of the loss and inconvenience attending the working of foul silk.

It may further be remarked that it is indifferent whether Silk be fine or coarse as an article of trade, there being a demand for all sizes. Some countries seem

to produce only fine Silks, others mixed fine and coarse Silks, and others again only coarse Silks. These variations may reasonably be imputed to climate and the character of the worm, although other reasons may be conjoined with them. Cabool possessing Silk districts varying in the conditions of climate as much as Naples and Lombardy may do from Piedmont, the probability would seem to be that they are capable of yielding Silk of various qualities and sizes, which would better meet the general demands of the home markets. While it is matter of indifference of what size silk may be, so long as it is clean, it must be noted as a point of minor detail, that it is very necessary it should be of uniform size in the same package or bale : as a mixture of many sizes, besides being inconvenient to the consumer, would mischievously affect the price."

The remaining articles consist of a letter by Mr. Ross on the lack of encouragement for the Mauritius Sugar Cane, of which during 1841 about 150 Beegas had been planted, 100 under contract for the Hewra Sugar Manufactory, and the remainder on private speculation, likely, in Mr. Ross' opinion, to end in disappointment.

A communication from Mr. N. Kirkland, on the mode of cultivating Tobacco in the Kaira Zillah. The seeds of the three kinds of Tobacco grown in this Zillah were imported from Khandesh, one mode of treatment serves for all :—

"The seed is first sown in beds in order to transplant ; these nursery beds are prepared by putting 2½ cart-loads of manure in 1 wussa of "uwal goraroo," or the best kind of brown soil, and ploughing it up once, and then after a fall of rain during the *nuxetur* or lunar asterism, called *ahrudra*, in the month of July, small embankments about three inches high are raised around the land, which is divided into four beds, in each of which two ounces of the seed is thrown broad cast, and the earth is raked up to the depth of an inch with the *punjeytee* or rake ; if it rains the beds are not watered, but if there is no rain the beds are filled with water to the depth of two inches. Should there still be no rain, the beds are again watered, after an interval of four days, in the same manner as before, and eight days after sowing, the shoots will appear above ground, which will be nourished by rain if it falls, but if there is no rain it is necessary to irrigate it once every week ; the ground should be kept clear of grass, &c., by continual weeding, and the plants are to remain in the nursery-bed during the Nuxetures of Ahrudra, Poonerwussoo, Poosh, and Usleysha or until about the 15th August : when the plants have put forth four or five leaves, and grown about four inches from the ground, they are fit for transplanting.

The ground in which the Tobacco is to be transplated is chosen from the best kind of the goraroo or brown soil, in a beega of which twenty cart-loads of manure is thrown in the month of June, and after a fall of rain in July, in the Nuxetur of Ahrudra, it is ploughed up once, which is repeated weekly for seven weeks, after which the clods are broken, and the earth levelled, by means of the sumar or flat log of wood drawn over by bullocks. During the Nuxeturs of Muga and Purwu, generally in the month of August, the plants are taken up from the nursery-beds, with a portion of earth at the roots, and transplanted, during a drizzling fall of rain, one hat'h or nineteen inches apart in the ground prepared for their reception, but if there is no rain, the places where plants are to be put are moistened by pouring about two seers or pounds of water in each place, and if there is no rain for a week, and the ground begins to be dry, it is loosened by means of the *rampree* or weeding-plough ; this is repeated after the lapse of another week, and the ground cleared of grass and weeds. A month after transplanting, the Tobacco grows to the height of about one hat'h or nineteen inches, each plant putting forth from ten to fifteen leaves ; the tops of the plants are then broken off, after which the plant begins to throw out additional shoots from the parts where the old leaves are joined to the parent stem ; these new shoots are called Peela, which are broken off weekly from all the plants, excepting ten or fifteen which are reserved for seed : the seeds are formed on the new shoots called Peela. If there is a well adjacent to the Tobacco-field, it is watered once or twice in the month after the rains, or if the monsoon fails ; Tobacco so irrigated is called "Peeth-nee Tumbacco ; that which is not irrigated is designated "Kooraut Tumbakoo." The last-mentioned kind is mature in the month of January, and the former from the middle of February to the end of March. The Kooraut description of Tobacco when ripe is cut down near the

ground, and laid in rows in the same place where the plant was standing, and left so for seven days; on the night of the eighth day water is squirted from the mouth in the form of spray upon it, and the next day, before the sun becomes hot, it is brought home, and, whilst yet moist, they are separated from the stalks, and laid one over another until it forms a bundle of about four seers in weight; but if the leaves are not moist enough at the time of forming the bundles, water is again squirted upon them from the mouth. "Kooraut" Tobacco so prepared is called "Kalleea," and chiefly used in smoking. A beega of land yields from ten to fifteen maunds; the price, in a favourable season, on an average is from Rs. 1½ to Rs. 3 per maund, according to the quality of the article. This Tobacco is cultivated mostly in the Borsud, Nepar, and Neriad Purgunnas, and is exported to Surat, Bombay, and Katteeawar.

The irrigated Tobacco called "Peeth-nee Tumbakoo," when ripe is not cut down like the Koraut, but the leaves are gathered from the stalks whilst standing in the field, and left there exposed to the sun for fifteen days, undergoing the same process of moistening by squirtations as the Koraut description; after which it is bound in bundles of 2½ seers each: thus prepared it takes the name of Jurda. A beega will yield from twenty to thirty maunds. The average price, in a favourable season, is from Rs. 1 to Rs. 2½ per maund. This Tobacco is chiefly used for chewing, and exported to Malwa, Wagur, and Bombay.

From the three kinds of Tobacco mentioned in par. 1st, the produce from the seeds of the Tullbda and Peeleeoo is mostly cultivated in the Kaira Zilla; the Khandeshee is produced in few villages only. It is hard to distinguish the seeds of the three different kinds of Tobacco above alluded to; the cultivators, however, find out, from the appearance of the leaves when green, the different kinds, and then keep the seeds separately, for the purpose of sowing; but when dry, and made into bundles, they all seem alike.

From the 544 villages comprising this zilla, Tobacco is mostly cultivated in 100 villages of the Churotur; but the undermentioned villages are famed for the superior quality of Tobacco, on account of good ground and water:—

Villages producing the Koraut, or unirrigated description of Tobacco.

1. Esnow.
2. Peeplao.
3. Soonao. Lands under the Well called Deokooee.

Villages producing the Pheethnee Tumbakoo, or irrigated Tobacco.

1. Wurtal.
2. Lands near the Chucklasee Bhagul of Neriad.
3. Sundana. Lands under the Well called Kharree Koee.
4. Kutthana of Borsud Purgunna.

The best and worst sorts of Tobacco are not the produce of particular fields, but depend upon the labour, care, and skill of the cultivator, and in some degree on the quality of the water. The Khandeshee weighs heavier than the Tullubdee; it is particularly liable to two misfortunes, the "Aeem," or frost in the "Seealao," or cold season, and the other the rain which sometimes falls about the Hoolee, when it is cut, and lying out in the fields to dry.

The expenses of cultivating a Beega of land with Tobacco, and the return derived therefrom, are as follows:—

Koraut Tobacco.

A Beega of land is said to produce, on an average, 12½ maunds of Tobacco, which at the price of Rs. 2¼, amounts to Rupees 28-2.

Deduct probable expenses that would be incurred to a landholder cultivating through the aid of another.

22 cart loads of manure ...	Rs.	9	0	0
Hire for weeding ...		0	8	0
Ditto for ploughing ...		3	0	0
Ditto for breaking off the new shoots ...		1	0	0
Ditto for forming bundles ...		4	0	0
Cess of land ...		6	0	0
		23	8	0
Net profit to the landlord ...		4	10	0

Irrigated Tobacco, called Peethnoo Tumbakoo.

One Beega of land is said to produce, on an average, 25 maunds of Tobacco, which at the rate of Rs. 1-12 per maund, comes to Rs. 43-12.
Deduct expenses as for Koraut :

	R.	A.	P.
22 cart loads of manure ...	9	0	0
Hire for weeding ...	0	8	0
Ditto for breaking off the new shoots ...	1	0	0
Ditto for watering ...	6	0	0
Ditto for ploughing ...	3	0	0
Cess of the land ...	9	0	0
Hire for forming bundles ...	4	0	0
	32	8	0
Net profit to cultivator ...	11	4	0

CAMP MEHMOODABAD.

"Last season the cultivation extended to 10,256 begahs of irrigated, and to 3936 of unirrigated—in all 14,192 begahs, which was less by 4317 begahs than the year previous. The former was said to have yielded as high as 30 maunds per Beegah, and the latter reached to 15 maunds only, and the price at which it sold was from 12 annas to Rs. 2-4 per maund of 40 seers."

N. KIRKLAND.

Mr. Elphinstone has a paper on the experiments made in Malwan on the cultivation of the Carolina Rice, the results of which are likely to be very important : a portion of the seed was forwarded to Mr. Elphinstone by Mr. Giberne in 1839.

We subjoin the results of trials in 4 Talookas.

"The natives, who have cultivated it, now acknowledge its superiority in every respect to the country rice, in spite of their previous prejudices against it. It only requires to be better known and extended when I conceive its introduction will prove a source of great public benefit to the country." *Extract from Mr. Elphinstone's letter.*

Talooka Malwan.

1839-40	Hot Season,	½	Seer, produced		3	Seers by irrigation.
1840-41	Rains.........	2¾	„	„	28	„
1840-41	Hot Season,	16	„	„	53	„ by irrigation.
1841-42	Rains.........	24	„	„ M 3.	8	„

"The Mamlutdar writes, the ryots of this district say that the return of the crop yielded by this rice certainly exceeds by one-fifth that of the country rice."

Viziadroog.

1839-40	Hot Season,	1	Seer produced		16	Seers by irrigation.
1840-41	Rains.........	16	„	„	1. 60¼	„
1841-42	Rains.........	18¾	„	„	2. 37	„

"The Mamlutdar reports, that the stalk of this rice is strong, the ears good, and the crop good, and in all these respect it is superior to the country rice. It takes a medium time to ripen, being neither a late or early crop. The above information is derived from Ragho Mahadeo Lely, who has cultivated the largest portion in this district of the foreign rice, and I concur in the above opinion, as I have seen the crop, and I consider that, with proper attention, this rice will yield a larger crop."

Severndroog.

1840-41	Rains........	¼ Seer produced	5 Seers.	

" The quantity of this rice that has been cultivated here is so small, that I am unable from it to determine accurately whether it yields a greater abundance of crop than the country rice ; but from what I have seen of it this year, I am inclined to suppose that it would yield about the same quantity of crop as the country rice."

Rutnagherry.

1839-40	Hot Season,	½ Seer	produced	1 Seer	by irrigation
1840-41	Rains........	1	,,	,,	14 ,,	
1841-42	Rains........	13	,,	,,	1. 13 ,,	

" At sowing, two-thirds of the seed was washed away by the heavy rain that then fell, while only a third remained, from which the crop was obtained. The rice of the Carolina seed is of a good white colour, and does not break like the country rice. The ears are large and very tenacious of the grain, which is not liable to be shaken out of the ear as is the case when nearly ripe with the country rice, in strong winds ; and this is a benefit to the cultivator. The straw of this rice is thicker, taller, and stronger than that of country rice, and therefore less liable to be laid low from heavy rain or strong winds, consequently the ryot can reckon with greater certainty on reaping his whole crop ; and the additional straw obtained is an advantage. The productiveness of this seed is fully equal to that of the best sort of country rice."

Note.—To increase quickly this seed, the crop produced in the monsoon was re-sown in the hot weather, and *vice versa*, but it was found to have a deteriorating effect on the size of the grain produced (the rice of the hot weather and of the monsoon being, in this collectorate, raised from two distinct sorts of seed, which are kept apart), therefore, the practice of sowing the Carolina Rice in the hot weather has been recommended to be discontinued."

The remaining article by the same gentleman relates to the experiments made for the improvements of India Hemp Cotton, according to instruction furnished by an English gentleman and circulated through the Revenue Commissioner by order of Government.

The experiments have not been so satisfactory as could have been desired.

" It appears, however, to those here who have examined the samples herewith, transmitted, that those which most resemble in greenness the Baltic and European specimens sent to me, are the worst and weakest of the lot, and that the other samples prepared with the least deviation from the usual process of the natives is the best."

We trust, however, that the suggestion offered by Mr. Elphinston, and the earnest desire now manifested to improve the various indigenous productions of the country will be perseveringly prosecuted. European skill and intelligence can scarcely fail to effect a beneficial result in matters of this nature, and notwithstanding the indifferent success of these experiments better results will yet appear.

SELECTIONS FROM BRITISH AND OTHER PERIODICALS.

Memoir on the Application of Asphaltic Mastic to Flooring, Roofing and Hydraulic Works in India.

By Captain H. Goodwyn, Engrs.

[As we consider that the subject treated of in the following memoir is of very considerable importance in this country and that the advantages it suggests

and offers cannot be too widely brought to notice, we are led to include it in our selections for the present Number of the 'Review.' Some slight difference of opinion, it will be seen, exists on the cost of the asphaltic mastic in its application to any purpose in this country, but no difference of opinion does, or, we believe, can exist as to the application of the asphaltic itself; its perfect applicability to the various purposes named in the memoir have been proved and acknowledged. So fully, indeed, that it is matter of surprise that it has not, ere this, in Calcutta, at least *in high places*, taken the place of the ordinary material for flooring and terracing. Its greater durability and its perfect resistance to those fell destroyers of the works of man, the white ants, as well as its impenetrability to damp, or even water, render it beyond all question one of the most valuable boons which the architect and builder could receive. We know how difficult it is to persuade people to go out of the ordinary and beaten track, to adopt new plans of operation or the use of a new material whilst the old possess the triple advantage of being better understood, prepared at hand and cheaper. In the case before us there is a little more trouble, a little more difficulty, a little more expense, and perhaps a little doubt as to its being all that is represented. These are points of objection which we conceive it would not be very difficult to surmount and remove altogether. We consider it so greatly important in this country that we cannot help thinking it deserves the notice and patronage of Government, and of the aristocracy of our city, who might adopt its use in all public buildings and offices under their controul, and thus establish by direct experiment the value of the improvement and the facility, under proper management, with which it may be applied. It requires to be started and tested, to be seen and understood; when all this is done there will be, we feel assured, no backwardness in its adoption by the people generally. Captain Goodwyn deserves the highest credit for the zeal and ability with which he has advocated the use and extension of asphalte to this country, as a material in building. Health and domestic comfort are likely to be so greatly affected and improved by its adoption that in that point of view alone it deserves the most serious attention. We trust it may receive it, and not, like too many other projects for the public benefit in Calcutta, be consigned to oblivion and neglect.] ED.

At no period probably did there exist such an union of essential qualities in the means of constructing as at present. Allusion is here made to the value of the material employed and the art of working and disposing it, so that in all classes of erections, whether private or public, there is an addition to personal comfort and convenience combined with permanency of structure at an economical original outlay, estimated with reference to the least possible expence in subsequent maintenance.

The following memoir, in connection with others, having relation to the improvements of the age, is drawn up with a view of introducing a most valuable material to general notice, one worthy the patronage of the Government as well as the attention of the merchant, the planter, and all connected with building of every description; a material which has been extensively used with the most complete success on the continent for some years, and lately equally so in England. The excellent qualities and varieties in the mode of its application have received the approbation of the Heads of our Engineer corps now at home, Generals McLeod and Tickell, Colonels Hutchinson and Colvin, in consequence of whose opinions I brought it to the notice of the Court, and was by the Directors permitted to bring some to Calcutta to be submitted to experiment. This is sufficient authority for my advocating its adoption, and constitutes a guarantee for its future success in India. I will here slightly anticipate the subject by noticing the result of an experiment by which I undertook to prove the efficiency of the substance to resist great heat, lest any sceptic should stop short

of a full investigation of its merits under an idea that its component parts being bitumen and pitch, it would not answer in India.

A section of prepared flooring in a wooden frame 12 × 6 with a surface of $\frac{3}{8}$ of mastic was placed in a large oven (used for reducing the asphalte to powder) with a thermometer which directly rose to 230°, and though kept in for 6 hours, it presented a surface at the end of that time quite free from grease, proving that the pitch, the proportion of which is small, was not drawn out by the great heat, the extent of which I could not ascertain as the Thermometer tube broke shortly after insertion. A very few minutes after being spread in a fluid state, it again resumes its original density which is such that at 100° Fahrenheit it resists all impressions from ordinary force. How frail and perishable are the floors and terraces of ordinary construction ?—in many situations unable to resist the wear and tear to which they are exposed from a variety of causes, such as the friction of stores and other heavy articles in magazines and store rooms, the dragging to and fro of boxes, cots, and musquets in Barracks, &c. &c. whilst public as well as private property suffers considerably from the facility of access to white ants and damp through the slightest crevices in floors. Who is not aware of the rapid increase of the smallest hole in a terrace floor, and of the difficulty of efficient repair from the want of combination between the new and old material. It must surely then be no small matter of consideration, the employment of a material which offers a remedy for these evils and affords a means of putting a stop to the constantly recurring heavy outlay on repairs.

It is well known that the use of a bituminous cement was common in ancient structures, and history informs us that the walls of Babylon, that wonder of the world, were cemented with hot bitumen. In the destruction of some remains of fortifications, supposed to be of Roman erection. near Pyremont about 45 years ago, so great was the tenacity of the work that it was not pulled down without the aid of gunpowder, which circumstance led to an important discovery. It was observed that the cement resembled the asphaltic rock of Pyrimont, about 5 miles north of Seyssel, at the foot of the eastern side of Mount Jura, on the right bank of the Rhone, in the department de L'Aîn. Several applications of the substance were immediately made, and the experiments on its properties as a cement for building masonry and keeping out damp succeeded entirely, since which, the working of the material has become of great importance. In the immediate vicinity of the asphalte is obtained a peculiar kind of mineral pitch, which, mixed in certain proportions with the asphalte, forms the mastic, the subject of this memoir. Mr. Claridge, an English gentleman, has taken out a patent for it in England, and is most successfully bringing it into general use under the sanction of the commissioners of woods and forests.

The surface of the ground in the locality of its discovery is covered by a molasse, consisting of silicious gravel and bitumen intercepted by deep ravines. A mass of calcareous asphalte is situated between two of the Ravines, the external appearance of which is whitish, but internally it is of a deep brown color. The asphalte is equally diffused throughout the rock, in some places more or less saturated but in others the calcareous matter is quite pure*, leading to the conclusion that the asphalte is ramified in veins in the mass under the molasse. The calcareous asphalte is not stratified, fissures are seen intersecting each other in all directions. Various are the opinions of its formation, but the following is the most probable, that it has been generated by heat naturally acting on the bituminous matter below a strata of carbonate of lime ; some of the bitumen has passed up and mixed with the lime, by nature adjusted in just such proportions as the lime would absorb ; thus has been effected by a natural force what by art could not have been, and it is this which renders this material so far superior to any manufactured article.

The resinous and sulphuric particles have passed up to the surface and formed a crust so that the inflammable qualities as well as the naptha have been destroyed by volcanic agency and the material is not liable to ignition. The calcareous asphalte contains from 15 to 18 per cent of Bitumen, the remainder is carbonate of lime. The Bitumen from the results of experiments of a French Chemist is found to be a compound of

Resinous petroliferous matter	60 to 70
Carbon	30 to 35

It is from the Carbon that the dark color and property of hardening in the air arises which renders it so useful in the arts. The spaces below the Carbonate

* Bulletin de la societé Geologique de la France vol. viii. p. 138.

of lime are fissures containing the mineral pitch, which is formed of the heavier particles of bituminous matter and Carbon in another form, probably having experienced greater heat. As used in England and the continent, the asphalte is reduced to powder by baking and being mixed with a proportion of about 1-10th its weight of the pitch, and a fine grit is reduced to a semifluid state, and poured on to the spaces or moulds prepared.

For exportation, however, the substances are formed by the company in England into a mastic, and sent to distant parts in blocks of a cwt. each ; by this means it is rendered useful to those who may not have had the advantage of witnessing the mode of application in England, as the mastic has merely to be heated and laid down in the way which will be described hereafter. The mastic possesses nearly the hardness of stone, but preserves a certain elasticity which prevents the surface from wearing or chipping, and carriage wheels and Horses hoofs cannot disturb the evenness and regularity of its surface. Not the least of its valuable properties as a material for building purposes in India, is the facility of its removal from place to place, for after having been laid down as a terrace in one building for years, it may be taken up, and requires merely to be reheated to be laid down elsewhere with equal utility. It is anti-electric which makes it valuable for roofing purposes, and is not inflammable, the quantity of pitch being so small. The late fire at Hamburgh is proof of the non-inflammability of the material ; for the roofs of many houses were terraced with it, and where great alarm existed lest these roofs should burn and cause more devastation, they fell in solid masses unconsumed, and instead of serving as fuel, extinguished in their fall, the flames beneath them. It is wholly impervious to moisture and can be extended indefinitely, and even where joints are necessary they can be so closed as to present a continuous surface ; neither does it impart taste, smell or color, to any liquids that may come in contact with it when employed to line tanks, vats, reservoirs, &c. Having thus stated its origin, composition and essential qualities, I will proceed to the modes of its application.

The purposes to which it has been applied in France are so extensive and various that they first claim attention. The Chevalier de Pambour states that the pavements in several crowded thoroughfares of Paris have been made of this substance for the last 6 years,* and are now in excellent order ; it has resisted the oscillation on suspension Bridges, and the varying temperatures of heat and frost, the asphalte being on such structures as perfect as the day it was laid down. For roofing edifices, lining water reservoirs, and paving stables it has been particularly useful, having been laid down seven years in the stables of Cavalry Barracks. It has been extensively applied in the fortifications of Lyons as stated by M. Gahan, a Captain of Engineers, also at Lisle and Vincennes, and the artillery have covered the roofs of wharehouses several years since in the arsenal at Douai which have withstood all weathers. The naval department also have made numerous trials of it in the various buildings at the port of Toulon, and it is being introduced into the other ports of France, the pavement formed of it resists better than stone the friction of chains in Dock yards, and in Jails and Hospitals it has been used not only on account of its durability but that it keeps particularly clean, and ablutions are performed more easily on it. The material is also used on the " Pont Royal and Pont de Carrousal," on the areas round public fountains, in the court yards and extensive floors of Colleges and Churches.

It has been employed as a cement, and is more particularly valuable under this head for hydraulic works ; several large tanks have been constructed in Paris with it. The mode adopted having been to cover the faces of the bricks that were to be exposed to the water with a very thin coat of asphalte, they were set in fluid mastic instead of cement, which was also poured into spaces left for the purpose of $\frac{1}{4}$ in. between the inner and outer bricks forming the side walls as the work advanced. The bottom was afterwards covered with $\frac{3}{8}$ths of the mastic. Its use as a cement for hydraulic purposes is not new, for Buffon in his natural History article, " Bitumen," says, " jái fait enduire il y a trente six " aus un assez grand bassin du jardin d'histoire naturelle qui depuis a toujours " tenu parfaitement l'eau." That Buffon did so write is stated in a pamphlet called " Observations generales sur les mines bituminenses du Pare de Pyrimont." In the " Place de la concorde," in the centre of which the Egyptain obelisk is erected, about 24,000 square yards of most magnificent pavement are laid down of asphalte in elegant mosaic work, the fluid substance was spread in moulds of

* This was stated on 1840.

bar iron of the required pattern, which, in this instance, is alternate squares of black and white, each square having a circle of the opposite color to itself in the centre. At the estate of the Baron de Montmorenci is a conservatory floored in the most splendid manner, the substance being formed into patterns of foliage and scrolls with a rich Grecian fretwork border. In London it has been used in several places, the noble piece of pavement at Whitehall and the carriage drive to the Ordnance Office may be cited as examples. The roofs and terraces of several noblemen's houses are covered with it, and its efficiency universally acknowledged. In the manufacturing towns, the floors of large workshops and storerooms are laid with asphalte, and the terraces of many sheds of Railway stations. The whole of the arches of the Greenwich Railway are covered with it with a view of preserving that extensive viaduct free from damp. It is used as a foot pavement in many of the metropolitan parishes and in country towns also, and one of the principal streets of Liverpool is paved with it. To such a mass of evidence, of the great utility and value of the material, as it has been applied in Europe, there is to be added the experiment of its efficacy as lately laid down in Calcutta, the Court of Directors having permitted the writer of this memoir to bring out a ton of the mastic for the purpose of testing its fitness for the public service. Petroleum oil is to be found in the neighbourhood of Rangoon and on the Irawadee N. E. of Pegu and elsewhere, which substance, after the naptha is distilled from it,* will answer as a substitute for the mineral pitch, and render the asphalte cheaper to use in India, as the pitch need not be imported. In case some such expedient should be resorted to, I will here annex the cost of the separate material, as well as of the mastic or compound as sold by the proprietors in London :—

	£	
1 Ton of asphalte in powder	5	0
Cask, &c.	1	4
Mineral pitch (proportion 2 cwt.)	1	18
Total £	8	2

The mastic is in blocks of 1 cwt. each 18 × 6" × 4" and £ 6-10 per Ton. With the mastic however a little pitch is necessary to flux the first quantities when using as will appear presently :—

1 Ton of asphalte or	20 cwt.
Fine Grit	8 do.
Pitch	2 do.
Total	30 cwt.

will cover a space of 400 supl. feet ⅜ths thick for flooring, exported in large quantities, the cost of 100 supl. feet of flooring would be from 12 to 15 Rs. exclusive of the substratum of concrete.

Instructions for use.

The mastic being ductile great care must be taken to have a good foundation of Concrete, or lime and gravel, or broken bricks, with a thin coat of Hydraulic mortar over all, the surface being made level, on this the mastic in a semifluid state is laid ⅜ths in thickness.

Mode of preparing the Mastic for use.

In the absence of a proper cauldron, such as is shewn in fig. 1 Plate 18, a large pitch pot may be used over a strong fire, the blocks are broken up to the size of 5 or 6 inch cubes and put into the cauldron with 1 per cent of pitch to flux the lower layer ; more mastic is put in by degrees when the first quantity is melted, which will flux the rest in succession, care being taken to stir it the whole time with the instrument shewn Fig. 2.

When the cauldron is full, or a sufficient quantity melted, and it has assumed the consistency of Jam it is fit for use. If the work is extensive a number of cauldrons

* The price gained for the naptha might cover most of the expense of procuring the petroleum. Lime stone impregnated with bitumen, dried, ground and mixed with its own weight of coal tar is an admirable cement, and will form a most desirable terrace ; its mode of using, the same as asphalte.

should be heated at once, as one of the indicated dimensions will not lay down more than 70 supl. feet*.

In laying it down a lath of the required thickness of the coating is placed across the floor, or roof prepared as above, which from the wall or curb, as the case may be, should divide the whole space into compartments of about 2 feet 6 in. wide. It is necessary before laying down the mass to cut a small channel (if for a floor, under the wall,—if for a terrace, close to the curb) of 2 feet wide and 1 foot deep into which hot mastic should be poured and taken up again when settled in order to warm, and enable the whole to bind and adhere at the edges. Into the compartments above mentioned the mastic is poured with a large ladle, the bowl of which should be a foot in diameter and 6 inches deep. Each ladleful as it is poured in is rubbed from the centre towards the wall or curb with a wooden float (made of cask staves) and a smoothing rod of 3 feet long and 2 in. square is applied to level the surface by a man immediately in rear of the one who uses the float, who also, whilst the substance is still hot, sprinkles a powder on the surface through a very fine sieve composed of the finest sand and unslaked lime reduced to an impalpable powder in equal quantities, which is rubbed in with a flat board and gives a white surface to the terrace which does not wear off. The surplus is carried forward with such a hand brush as figure 3. As soon as the liquid material is smoothed, care should be taken to force the substance well into edges and joints, and in removing the guage rod, not to lift it, as it may raise the asphalte with it; but by a gentle tap to loosen it horizontally from the mass. In laying down at two different times, when the first layer has had time to harden, the edge must be warmed with a little hot material laid on for a minute and removed, the work then to be proceeded with directly. If a roof is covered with wood, coarse canvas should be stretched over it and nailed, and the mastic laid on that, finishing it off with a fillet, as shewn in fig. 4.

Store rooms and Magazine floors should be ¾ inch thick, stables ⅝ of an inch and carriage drives 1 inch, coverings of arches ⅝ths.

[With reference to the estimated cost of the mastic flooring for Calcutta, a friend has furnished us with the following estimate with which he has been most obligingly favoured by Mr. S. Mornay, Civil Engineer of this city.

"According to Captain Goodwyn's statement, to cover 400 sq. ft. of terracing in Calcutta with Asphalte, would cost,—

1½ tons of Mastic (@ 2s. per rupee) ....Rs.	97	8
Freight to Calcutta	15	0
Commission charges, &c.	5	8
Fuel and Labour	12	0
	130	0
or ℔ 100 sq. ft. ....Rs.	32	8

"Therefore the terrace complete, would cost, ℔ 100 sq. ft.

For the usual Concrete...........................Rs.	12	0
For the coat of Hydraulic Mortar	4	0
For the Mastic ....Rs.	32	8
Rs.	48	8
"A very good roof, of the ordinary kind in use here, which will remain tight for 3 years, and then only require 4 annas ℔ ann. expense on it, costs ℔ 100 c. ft. Rs.	14	0

S. MORNAY, *Civil Engineer and Builder.*"

This estimate, it has been stated to us, is too high, unless the substratum be of the most expensive kind, but even this, we think, can scarcely form any reasonable ground of objection to the new material. We have heard within the past

* The cauldron must not be left standing as the material will burn.

hour that an Engineer and builder of this city estimates the cost of the best mode of flooring hitherto used, that in which a layer of Tar is placed beneath the chunam floor, at 37 Rs. for an area of 100 superficial feet, and when we bear in mind the rapidity with which all mixtures of sand and chunam are frittered and swept away in clouds of dust, we think the advantage of the Asphaltic Mastic is placed beyond dispute.] *Ed.*

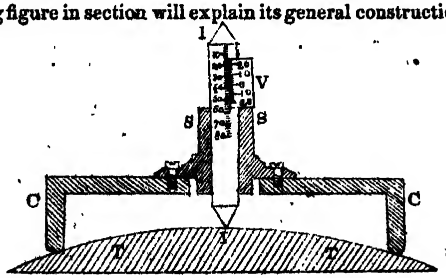
THE SPHEROMETER, AN INSTRUMENT FOR ACCURATELY MEASURING THE CURVATURE OF GRINDING TOOLS AND LENSES,

Invented by Mr. A. Ross of Regent street.

In order that our readers may form a correct notion of the use and importance of the instrument about to be described, it is necessary to premise that very great accuracy is required in determining the radii of curvature of the tools on which the Lenses of Telescopes are ground. One of the methods for accomplishing this purpose was by grinding in the tool the edge of a plate of glass until it accurately fitted the tool, and thus formed what was technically called a template. "This," says Mr. Ross, "was laid upon a board in which two pins were inserted and the template guided by the pins was made to describe an arc of great extent. The chord and versed sine of this large arc being carefully drawn and measured afforded data for calculating the radius by the well known formular, $2\,R = \frac{\left(\frac{c}{2}\right)^2}{v} + v$, where R is the Radius, c the chord and v the versed sine. This, though obviously not a very precise method was sufficiently correct for verifying the theoretical deductions; and it was as accurate as the processes then employed in the glasses for Telescopes."

With the view of improving the usual processes, Mr. Ross devoted more than two years to a course of experiments for the purpose of discovering and obviating the causes of the discrepancies between theory and practise in this very important branch of optics. The result of his attention and labour was the invention of the Spherometer for which he received the silver medal of the "Society for the encouragement of arts."

The following figure in section will explain its general construction and principle.



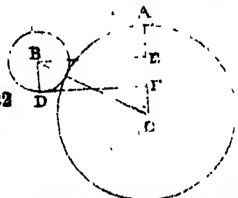
TT represents a portion of the convex tool to be measured, a short cylinder CC nearly closed at one end has its edge accurately turned and ground to a portion of a circle whose radius is known.

In the cylinder is inserted a carefully made square socket SS screwed to the end of the cylinder CC. In the socket SS a square index bar II is made to fit

and slide accurately and easily, the conical points of which are of hardened steel; and upon these points as centres the cylinder CC is ultimately turned and ground, by which means all errors of workmanship are obviated so far as relates to the fitting and fixing the socket in the center of the cylinder. The index bar II is divided on one face to 1-50th of an inch and a vernier V is secured to the socket by which it may be read to 1-1000th of an inch or by estimation to 1-2000th.

If the edge of the cylinder were made square instead of circular, the inner diameter would be in all cases the value of the chord, but the difficulty of preserving uninjured a sharp angular edge determined Mr. Ross to adopt the circular edge as already stated: by this form it will be clearly seen that the value of the measured chord must vary with every degree of curvature in the tool. To obtain the value of the radius unaffected by the varying value of the chord, Mr. Ross has devised the following formula:—

Let BE = FD, the known semi diameter or half the distance between the centres of the small circles which form the edge (which is determined by gently rubbing the cylinder on a perfectly flat surface, and measuring the diameter of the ring thus marked on the circular edge)........................ $= a$
AF the apparent versed sine as indicated by the vernier........................ $= v$
EF = BD the known radius of the edge of the Spherometer.................. $= r$
AC = the radius of the tool sought.. $= R$



$$
\begin{aligned}
\text{Then } AE &= v - r \\
CE &= R - (v - r) = R + r - v \\
CB^2 &= CE^2 + BE^2 \\
\text{that is, } (R + r)^2 &= (R + r - v)^2 + a^2 \\
&= (R + r)^2 - 2v(R + r) + v^2 + a^2 \\
\therefore\ 0 &= v^2 + a^2 - 2v(R + r) \\
\text{and } 2v(R + r) &= v^2 + a^2 \\
\text{or } R &= \frac{v^2 + a^2}{2v} - r.
\end{aligned}
$$

In a letter, addressed to the Secretary of the Society of Arts, Professor Barlow thus expresses his high opinion of Mr. Ross and of the instrument:—

"I beg to say that in principle it is perfectly correct, and with the assistance of good workmanship, such as Mr. Ross is capable of, I have no doubt it is also practically accurate. Mr. Ross is well able to judge of the delicacy of the measure requisite in carrying out theoretical investigations so as to render them of practical utility; and I have no doubt that in his hands such an instrument as his Spherometer would be of real practical utility.

I am, dear sir, &c.
PETER BARLOW."

W. A. Graham, Esq. [*See Trans. Soc. of Arts.*] *Ed.*

MESSRS. JOSEPH WHITWORTH AND CO.'S PATENT GUIDE SCREW STOCK.

(Communicated by the Inventors.)

The Guide Stock is entirely new in principle, and will cut a screw scarcely inferior to that obtained in a slide lathe from a true guide. The name has been chosen from this circumstance, as expressing the peculiar feature of the invention. The thread produced is not only true, and of the exact pitch required, but perfectly formed throughout, being cut clean without distortion of the metal.

In all these respects the advantage of the Guide over the common Stock is remarkable. The latter, it is well known, will not cut a screw in any degree perfect. The thread, besides being irregular, is never of the right pitch. It is also more or less swollen by the violence done to the metal, so that the diameter of the screw is often considerably greater than that of the blank shaft on which it is cut. These defects are attended with the most serious practical inconvenience. They often render it extremely difficult to obtain a fit between the screw and nut, and consequently occasion a considerable sacrifice

of time and labour. They necessarily impair in a very great degree the efficiency of the screw bolt, which cannot possess either the strength or mechanical power which it would have if the thread were cut true and clean.

The defects in question are variously modified according to the size of the master tap used in cutting the dies. If they have been cut by a master tap double the depth of the thread larger in diameter than the shaft to be screwed, they will act very well at first, and the thread will be started true, but as the operation proceeds, they become altogether unsteady and uncertain in their action. If, on the other hand, they have been cut by a master tap of the same size as the shaft to be screwed, the thread is made untrue in its origin. They first touch the shaft only on the extreme points of their outer edges, as shown in Fig. 5, Plate 18.

They have neither sufficient guide nor steady abutment, till the operation is on the point of being completed. It is not unusual to employ a master tap of an intermediate size. In this case, however, it is obvious the dies will combine, in a modified degree, the defects peculiar to each of the cases before mentioned.

In the Guide Stock this perplexity is entirely obviated, and the dies act with full advantage from the commencement of the operation to the conclusion. They are cut by a master tap double the depth of the thread larger than the screw blank; while their general form and the direction in which they are moved forward, are such as to preserve their cutting power, and steadiness of action undiminished to the full depth of the thread.

The plan of the Guide Stock will be readily understood from the engraving [Fig: 6 Plate 18.] A, the top plate, fastened by screws *a a a*; B, a stationary die; C C, moving dies; D, a sliding piece with inclined slides for moving the dies; E, a nut for drawing up the piece D. The interior of the stock is shown by dotted lines through the top plate A. B is a stationary die, C C are moving dies, brought up by a piece D, sliding in a recess in the stock, and bearing with a distinct incline against the back of each die. The piece D is drawn up by a nut E, on the outside of the stock.

The dies having been cut by a full-sized master tap, as before mentioned, the curve made by their outer edges is that of the blank shaft they are intended to screw. Hence, in starting the thread, they bear at all points of the common curve, and the impression made by indentation is the exact copy of the thread of the die. The parts indented serve as a steady guide to the dies, in cutting round the blank shaft. A groove in the stationary die facilitates the operation. Four cutting edges are brought into action, at points of the circumference nearly equidistant, so that by little more than a quarter turn, the thread is completely started round the shaft. The difficulty involved in the operation by the common stock is entirely removed.

After starting the thread, the stationary die serves principally as a guide and abutment for the others. The moving dies are peculiar in their form and direction, both peculiarities depending on the position of the arc in the shank of the die. The two sides have each a different inclination to the arc. As the die moves forward, one side becomes prominent towards the screw shaft, and its cutting edge continues in contact with the thread, till it is formed to the full depth required. The prominent sides of the moving dies are those turned towards each other.

The direction of the common die is necessarily towards the axis of the screw shaft. In the Guide Stock the direction of the moving dies is that of two planes, meeting beyond the centre of the stock, in a line parallel to the axis of the screw shaft, and considerably behind it. This direction is determined by reference to the change which takes place in the relative position of the screw shaft, as the thread is cut deeper. One of the three dies being stationary, there must necessarily be a constant change in the position of the screw shaft in relation to the two others, the effect of which, if not counteracted, would be to deprive the cutting edges of the requisite prominence. By giving them the direction before mentioned, the proper degree of prominence is secured, notwithstanding the change of position. The latter, when combined with the eccentricity of the dies, so far from being any impediment to their action, materially assists it. The newly-formed thread is thereby kept in contact with the dies, for some distance behind their cutting edges, affording them the same kind of support throughout the operation which they have at its commencement, when, as before observed, the curve made by their outer edges is coincident with

that of the screw blank. This continued support, which is necessary to steady their action, could not be obtained without a change in the position of the screw shaft. They would otherwise acquire too much clearance as they form the thread deeper, and their cutting edges would be apt to dig.

The steadiness of the Guide Stock, and its easy action in screwing, are equally remarkable. In using it, not one-half the force consumed by the common stock is required. The inner edges of the moving dies (which principally act in cutting out the metal) are filed off to an acute angle. This enables them to cut with extreme ease, and without in any degree distorting the thread, while they take off shavings similar to those cut in a lathe. Their action in cutting is in effect the same as that of a chasing tool, to which they bear an obvious resemblance in form. They may also be sharpened on a grindstone in the same manner.

A practical difficulty has hitherto attended the use of the Screw Stock, arising from the wear of the taps and dies. The tap becomes less in diameter, and consequently taps the whole too small, while the opposite effect takes place with the dies, which, being unable to cut a full-sized thread, leave the screw too large. The only mode of counteracting this twofold error, so as to obtain a fit between the screw and nut, is by forcing the dies forward till they have reduced the diameter of the screw a proportionate quantity. From what has been before observed, it is evident that this cannot be done in the case of common dies, without injury to the thread. In using the Guide Stock, on the contrary, it is attended with no disadvantage. Lest the diameter of the screw should be inadvertently reduced more than necessary, figures are stamped on the sides of the set nut E, to indicate when the thread is full.

Mech. Mag.

THE DAGUERREOTYPE, GALVANIC ETCHING, &C. BY A. SMEE, ESQ.

GLYPHOGRAPHY.

Electro-metallurgy promises to lend an important aid for printing surfaces generally, as an unlimited production will allow of the use of illuminated letters similar to those which graced the works of former years. There is but one obstacle to a great improvement in this department of the arts by electro-metallurgy, and that is the insecurity which the founder experiences in the absolute right to his productions; for if he incurs a great expense and executes a splendid design, as soon as he sells a duplicate he is liable to have the design pirated, when perhaps his original outlay will not be sufficiently covered. As soon, however, as more stringent laws are made to protect particular designs, every printed book will doubtless show the benefit of electro-metallurgy.

One of the most beautiful series of specimens of printing from electrotypes is to be found in an illustrated edition of 'Thomson's Seasons,' all the woodcuts of which were carefully preserved, and the actual printing performed from electrotype copies.

In no application of electro-metallurgy is the value of the science more conspicuously shown than in a mode of producing surfaces for printing, lately patented and called by the patentee Glyphography. This branch of art was invented by Mr. E. Palmer of Newgate street, and forms an important feature in the general illustration of printed works, and on that account demands particular consideration. The term Glyphography has been given by Palmer to this invention to signify that the original drawing itself is at once engraved, requiring no copying, and in fact scarcely any instruments, except those with which the artist makes his design. The mode in which so extraordinary an end is accomplished, appears ridiculously simple when it is detailed. The most essential part of the process is to make all the surfaces for printing as flat as possible, and for this purpose a plate of copper as used for engraving is first procured. This is blackened with the sulphurate of potassium in order that the draftsman may be enabled to judge of the effect which his drawing would produce, as he proceeds with his work. This blackened plate is warmed, and then coated with a compound of Burgundy pitch, white wax, resin, spermaceti, and sulphate of lead, previously fused together. This composition, which is nearly white, must be uniformly spread over the plate, and the thickness should be about the one-thirtieth of an inch. The plate is now ready for the artist, who cuts through the white composition completely down to the blackened copper, and in fact with the exception of that precaution makes his drawing in the usual manner. In the selection of tools the artist should be guided by

the manner in which they can completely and clearly cut out the composition; for it is important to make a clear indentation and not to turn aside the coating and leave a burr. A simple hook fixed in a wooden handle, a hook filed away on one side, which most effectually cuts away the composition, or a piece of wood tapering to a fine point are the forms particularly recommended by Palmer. The former instrument is best adapted for very fine lines, the second for larger lines, and the last for foliage and other free drawings and designs,

When the artist has finished his drawing, the parts of the composition which are removed leave black lines, which have precisely the same relation to the white ground as the black lines in the subsequent print have to the white paper; so that a most important feature in Palmer's operations is the exact similarity between the design and the print.

The plate upon which the design is drawn in the manner already sufficiently detailed is then sent back to the patentee to be treated differently, according as the artist desires an electro-glyphographic cast, or a stereo-glyphographic cast from which to print. If an electro-glyphographic cast is desired, and this is always to be preferred for very delicate and highly-finished drawings, the high lights are built up with any non-conducting substance, in order that they may not print. Where, however, the work is much thicker this process is not required, as the interval between the lines not being so great, the depression between the lines need not be so deep. The plate is then placed in the metallic solution and an electro cast is taken in the same way as in duplicate copper-plates, &c. As soon as this is finished, the back is soldered and mounted upon a block of wood or to a piece of metal. The block is at once ready for printing, and with the modern improved system of overlaying now adopted by wood-cut printers, the print is an exact copy of the original drawing. If the artist desires a stereo-glyphographic cast, Palmer takes a cast of the artist's drawing in plaster, when he cuts out the parts corresponding to the high lights, a proceedure which has the same effect as building up the lights for an electro-glyphographic cast. In this plaster-cast any little white lines may be inserted, which were not cut in the first design. The cast is then oiled; and a second taken from it, which second is sent to the stereotyper's to have a stereotype impression made. This is then ready for the printer in the same way as the eletcro-glyphographic cast.

The expense of glyphography being the same for the commonest and finest productions, the value of the art in a pecuniary part of view is most apparent when the design is elaborate, and for very common cuts the present mode is to be preferred, for it appears that the expense of such cuts would be less than the new mode; but it is said that map-engraving will be so readily executed in this way as to allow the introduction of surface maps whenever they may be required. The expense hitherto of executing surface-printing maps is so great as to prohibit their introduction, and the inconvenience of introducing copper-plate engravings into the text is so great as to limit their use.

Such are the principal features of Palmer's Glyphography, and when thoroughly brought to perfection, there is but little doubt that its good effects will be felt by every person who either reads or writes, or even looks at pictorial representations.

We have yet another branch of art to describe, which is an invention called the Electro-tint, which may be described in a very few words. A plain copper-plate is procured, upon which the artist makes a painting with some substance insoluble in the solution of sulphate of copper. The plate is placed in the solution and a reverse made, which is at once ready for the printer.

A great many specimens of the electro-tint, prepared by Palmer, who has a patent for the process, have been published at different times, and of various degrees of excellence, but the best that I have seen is a small portrait of Lance, by himself. There is something very pleasing in this print, and it shows at what perfection the art might eventually arrive. Sometimes the electro-tint cast is used to print from the hollows, at others from the elevations: thus, in one case it forms a kind of engraving, at another a surface similar to that of a wood cut.

The different cases in which electro-metallurgy is serviceable for the various departments of printing have been now described, and it appears to me that the general name of Electrotype ought to be restricted to these cases; for, although the propriety of the term, when thus employed cannot be doubted,

yet an extension of its use for dissimilar purposes is certainly inaccurate. The electrotype, therefore, I consider as one of the subordinate branches of the general science of electro-metallurgy; though doubtless, as the importance of the art of electrotype for our manufactures is extremely great, so also its interest is increased from its being the first department in which the electric fluid has ever been used extensively to further the manufactures of the country.

MULTIPLICATION OF THE DAGUERREOTYPE.

Papers and periodicals from time to time have contained accounts of the multiplication, in copper, of these splendid works. The success, however, which has attended these operations, I am afraid has not been so great as has been reported. From my own knowledge, I have but a little to narrate upon the subject, and this has been confined to the observation of two plates multiplied in this manner. The image on the copper duplicate of one was moderately distinct; but it did not become visible till it had been exposed to the sun's rays. In this case, there was nothing left on the original plate, nor was anything visible in either till exposed to the light. On the original, however, the image never returned; but the plate was uninjured, and therefore might be employed again. The second plate was a duplicate in copper from a plate of Dover Castle, executed by Dr. Simon, of that town, who also informed me that the image did not appear for some time. His view on this plate is more faint than that on the first plate, which is further increased by the reflection of the copper being nearly the same at the places where the image is, as where there is no device. There is, also the peculiar appearance on the plate, which is technically called "the curd." Dr. Simon informs me, that the impression will bear rubbing when it is apparent, but that the copper deposited upon a great number of plates had not the faintest trace of any view upon it. In one of these cases, the image was transferred from one plate to another rather than multiplied, because there was no increase of images, the image on the silver being only removed to the reduced copper, leaving the original plate quite plain and polished. In the other, original plate, however, a faint image was left.

Electro-metallurgy seems to be useful for the Daguerreotype in other ways besides the multiplication of the image, as sometimes a thin layer of gold is deposited, which fixes permanently the image, and gives it a peculiar tint. Perhaps, it might be a good plan to platinize or iridize the plate, as the impression might then appear black and white.

The process for the multiplication of the Daguerréotype is similar in all respects to that detailed for the multiplication of plain plates. Dr. Simon used the single-cell apparatus; but I believe that the battery will be found the best adapted. The film of air so often noticed must not be forgotten for the Daguerréotype.

It is necessary here to call the attention of my readers to the fact that notwithstanding Monsieur Daguerre was liberally rewarded for his invention in his own country, and France proudly vaunted her liberality in giving his discovery to other nations, yet a patent is taken out in England, which renders it illegal to apply it without the especial licence of the patentee.

GALVANIC ETCHING.

All our previous operations have been conducted at the negative pole of the battery; but at the positive pole certain effects take place which may be taken advantage of in the arts. Let us call to mind the fact, that gold, silver, and all metals with a greater affinity for oxygen, are dissolved when made the positive pole of a cell charged with a solution of the same metal. Now the relative distance which is maintained between the positive and negative poles affects the degee of solution which takes place. This property may be easily shown by attaching a wire by one of its ends to the silver of the battery, and placing the other in a solution of sulphate of copper, in the bottom of which a piece of copper connected with the zinc of the battery is immersed. After a short time, the wire will begin visibly to be dissolved, and the part nearest the negative metal will be affected; this will go on till the wire is dissolved, in such a manner that the part nearest the negative metal will diminish to the sharpest point, and the different amount of action will produce a perfect taper.

Although this property is of no value in its application, yet I have introduced it to show the facility with which the copper in every place is dissolved exactly in proportion to the electricity passing:

and this is likely to be extremely valuable for engravers in their etchings. The term etching is given to those engravings where the lines are not cut by any instrument, but are dissolved out by an acid. In order to make an etching, a copper plate is first to be prepared by covering it with a substance which protects it from the action of the acid in which it has to be immersed. The substance used for this purpose is composed of asphalte and wax in equal proportions, combined with a fourth part of both black pitch and Burgundy pitch. This mixture is placed in a piece of silk, and rubbed over the copper plate, which is kept at a moderate heat, by holding it over a lamp or chafing-dish. This operation is technically called laying a ground; this at first is colourless, but it is afterwards blackened by holding it over the flame of a candle, and depressing it till a copious supply of smoke covers the surface.

The engraver, with an instrument like a needle, called an etching point, executes his drawing, and in so doing removes the ground, and exposes a clean surface of metallic copper. The plate is then placed in a dish, and dilute nitric acid poured upon it, till the copper is dissolved out from the exposed lines to a sufficient depth. The plate is not allowed to remain in the acid a sufficient length of time to bite deeply, as this would cause the engraving to be of one degree of blackness; but after it has been in the acid a short time, those parts which are required to be of a light shade are stopped out, that is, they are covered with Brunswick black, or a coat of varnish capable of resisting the action of the acid; the plate is then replaced in the dilute acid, after a time it is again removed, and a farther portion is stopped out; and these operations are repeated as many times as there are differences of shade required in the engraving. The degree of perfection that the professed engraver obtains of practice is truly extraordinary, considering the uncertainty which must attend the operation; for the action of nitric acid is not subject to any regular laws, and moreover is never alike over all parts of the same plate. This is owing to the copper plate itself being never pure: but always containing tin, dispersed here and there throughout its texture, which resists the action of the acid. After a splendid plate is bitten in, some portions are sometimes left which cannot be acted upon by the nitric acid, but absolutely require the graver to bring up the fine lines.

No engraver that I have conversed with, can explain the cause of these faults in their work, but to the chemist they are perfectly intelligible; the nitric acid attacks the copper, forming a soluble nitrate of that metal which is dissolved in the fluid; but the action of nitric acid on tin is altogether different, for it converts the metal into a peroxide, which, being insoluble, protects the copper from the acid. The engravers have always noticed this white powder (the peroxide of tin), so fatal to the success of their operations.

Etching by galvanism is a far more certain operation than the foregoing, because it can be reduced to known principles. In this case, the plate to be bitten in has the device first drawn upon the same ground that is used in the ordinary process; the back and edges of the plate are then coated with wax, and it is to be connected by means of a wire with the silver plate of one or two of my batteries.

The size of the negative pole of copper, I stated in my former edition, should be as large as the positive or etching plate, but subsequent experiments have proved that to bite with greater regularity and sharpness, the relative size of the two plates should be as dissimilar as possible; for that purpose, a fine wire should be preferred, and when an equal depth is required, should be equidistant from every part of the plate.

The piece of copper to form the negative pole should then be connected to the zinc, when both the copper plate and the pieces of copper are to be placed in a solution of sulphate of copper. Immediately copper will be reduced from the solution on the negative plate, and copper from the etching plate will be dissolved to keep up the strength of the solution.

Whatever is favourable to the increase of electricity causes the copper to be more quickly acted upon, and whatever diminishes the galvanic current, retards the solution of the metal; the nearer the etching plate forming the positive pole, and the piece of copper forming the negative are approximated, the more rapid will be the action. In the same way, the intensity of the battery also affects the rate at which the plate is bitten in. The negative plate of copper, however, should not exceed in size the copper plate on which the etching is executed, or else there is a risk of some of the lines being more deeply bitten in; and in like manner, if any considerable parts of the

plate has a great deficiency of lines compared with other parts, that part must be stopped out rather before the other to insure a uniformity of depth, or else the negative copper opposite this part must be bent in such a way as to increase the distance.

The advantages of galvanism for etching, are—the absence of poisonous nitrous fumes, which are evolved in the ordinary process; the greater uniformity of action which takes place than when acids are used; and the rapidity of biting, which may be regulated to the greatest nicety. The lines may be made of any depth, and are sharper and cleaner than when acid is used; and lastly, no bubbles are evolved, which the engraver well knows are apt to tear up the ground or to cause unequal action.

The exact quantity of copper dissolved from the plate can be ascertained by weighing the metal reduced on the sheet of copper which forms the negative pole, or by measuring the quantity of hydrogen evolved from the silver plate of one of the platinized silver batteries; for thirty-two grains of copper will be dissolved for every forty-eight cubic inches of gas evolved.

Etching by galvanism can be executed with any desired degree of rapidity, according to the series of batteries to which the plate is connected; but I believe that the practical man will find that the action should neither be too slow nor too quick, and perhaps two or three batteries, arranged as a series, will be found best adapted, though a single cell would suffice.

Galvanism would be valuable to the engraver for executing gradations of shade, such as, for instance, the effect of a strong light illuminating a whole room. The most simple manner in which this can be shown, is to take a copper plate and draw a number of lines on the ground with a ruling machine. The plate, after having its back and edges coated with any non-conducting substance, should be then connected with the silver of the battery, and copper wire. These two should be then arranged in the solution of sulphate of copper, that at one end they nearly touch, while at the other they are widely apart. By this position, the greatest quantity of electricity would pass at that part of the plate where it is nearly in contact with the negative pole, whilst the least would pass at the opposite extremity. The action on the etched plate being exactly in proportion to the quantity of electricity passing, is unequal over the whole length of the plate, being greater where the metals are nearest, and gradually diminishing to the other end. This is the most perfect mode by which it is possible to obtain a gradation of shade. Many variations in the arrangements might be made by using, as a negative plate, a wire or a rod of copper, placed over the centre of a prepared plate; for then a perfect gradation would be obtained, extending in all directions from the dark centre. In the same way, two or more radiating shades may be obtained, by using two or more negative wires. An insensible gradation might be made from the darkest shade at the external edge of the plate, to the lightest point at its centre, by cutting out a hole in the negative piece of copper, opposite to the part where the transition into light is required.

The professed engraver who once practically masters the galvanic method of etching by the theoretical principles which I have here detailed, is sure to obtain great results. He could execute with ease the most extraordinary transition of light into darkness with fidelity, and with the utmost certainty. However, I trust that the value of electric etching will not be confined to the artist; for, by removing the disagreeble consequences attending the use of nitric acid in the present mode of etching, more persons may be induced to enter into it, and, by this means, numbers studying the sciences will be enabled to execute an etching of those objects which are curious and rare, to send to their brethren who are studying the same subject. Those travelling in foreign countries, or in picturesque situations, might transmit to their distant friends an idea of the sublimity and grandeur of the scenery which they are enjoying, or of the appearance of the towns and villages through which they are passing. In fact, there is not a person who might not be benefited by receiving etchings from others, and who might not, in return, circulate engravings of those objects which he may see. Pictorial representations are avowedly better than any verbal descriptions, so that there is ample scope for any one to exercise his talents usefully; and certainly many cannot be aware that etchings are not more difficult to execute than common pencil drawings. The process is as suitable for ladies to practise in their dawing-rooms, as are any of their usual amusements; the operation being attended with as little trou-

ble. It is necessary at first to have the plate prepared, or have a ground laid (which might be done by a workman), and at the conclusion of the drawing it has to be bitten in. The objection to this, hitherto, has been the disagreable properties of the acid, as it is likely to spoil clothes, or injure furniture; but now that these objections are removed, I trust that numbers will enter into this amusing and useful branch of art.

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Polytechnic Journal.

WHITE LEAD.

The manufacture of white lead, or carbonate of lead, is a subject of much importance, as well in reference to the extensive and indispensable use of the article, as to the preservation of the health of the workmen engaged in it.

The old and long established method of making it by placing sheets or fragments of metallic lead into earthen pots containing vinegar, and embedding them in tan or other inhumating material, which was adopted before a knowledge of analytic chemistry was acquired, seems to have given such a degree of satisfaction, as to neutralize the interest which usually urges the attention of men of science to the investigation of subjects of similar importance. But the length of time required to convert metallic lead into a carbonate by this process, the great expense attending it, its deleterious effects to the health of the workmen, and the large and increasing consumption of the article, have within a few years awakened the attention of chemists to the importance of discovering a process by which it could be more speedily and economically accomplished.

Numerous attempts to accomplish it have also been made by persons unacquainted with the science of chemistry, and upon principles altogether erroneous, which have, of course, resulted in failures, and in many instances, in a heavy loss of capital to the parties interested in the experiments.

A new, and improved method, and we believe upon correct chemical principles, is now being exhibited at the "late pin manufactory in the Borough road, Southwark," of which the following is a brief description:—

An iron shaft about three feet long is placed at an angle of about 45°; to the top or upper end of it a leaden pan is attached, which is about five feet in diameter and eighteen inches deep; a cover is fitted to the pan, but not so closely as to exclude the atmospheric air; 200 or 300 lbs. of granulated lead and eight or ten gallons of pure water are put in the pan, it is then made to revolve at ten or twelve times per minute; a stream of carbonic acid gas (obtained from the combustion of coke) is at the same time passed into it; the revolutions of the pan subject the lead to continued attrition, and expose each particle of it successively to the action of water, air, and carbonic acid gas. The atmospheric air supplies oxygen to convert the surface of the particles of lead into protoxide, which before perfectly formed, and while in a nascent state, combines with the carbonic acid, and thus forms a perfect and beautiful carbonate of lead, which is removed from the pan once in twenty-four hours, and a fresh supply of water and granulated lead thrown into the pan.

We cheerfully recommend this discovery to all who feel an interest in valuable and important improvements, as it is very evident that the injurious effects to which the operatives employed in the manufacture of white lead by the old process are exposed, are by this method in a great measure obviated, and the cost of manufacturing much reduced.

The novelty of this process consists in the construction of the triturating vessel, and in the introduction of carbonic acid gas to the granulated lead during the oxidising and triturating operation.

It is well known to chemists that nascent protoxide of lead has a much stronger affinity for carbonic acid than when converted into perfect oxide. The experiments made at Chelsea a few years since proved conclusively that good carbonate of lead cannot be made by exposing protoxide of lead to the action of carbonic acid gas.

Polytechnic Journal.

MINUTE MEASUREMENT OF TIME.

M. Lebonart, a watchmaker of Berlin, has constructed a Clock, which marks not only the hours and minutes, but even the thousandth part of a second. An additional circle is made for this purpose, outside the others, and a needle marks the thousandth part exactly. He has applied this invention to the measurement of speed of cannon balls, so that the ball in leaving the cannon, sets the hand in motion; and galvanic wire affixed to the mark and communicating with the hand, stops it the moment the ball reaches its destination.

METEOROLOGICAL TABLE, KEPT AT DINAPORE,

Days.	Moon's Changes.	Self registering Thermometer. Minimum.	Thermometer, in the shade. Sunrise.	9 A. M.	Noon.	3 P. M.	9 P. M.	Daily range of Thermometer.	Difference between wet and dry bulb Thermometer. 9 A. M.	3 P. M.	Winds. A. M.	P. M.	Remarks. Night.	A. M.	P. M.
1		63	63	77·8	82	83·6	75·4	20·6	16	23	N.E. light.	W.N.W.	Fine.	Clear and fine.	Clear and fine.
2		62·3	62·4	80	82·8	83·8	76·4	21·5	15	23	W.N.W.	W.N.W.	Ditto.	Ditto.	Ditto.
3		64·7	64·7	79	82	83·8	78·4	19·1	14·5	23	N.E. light.	N.W.	Ditto.	Ditto.	Ditto.
4		67·2	68	79·4	82·7	85	81	17·8	12	22	N.E.	N.	Ditto.	Ditto.	Ditto.
5		71·8	73·4	81·1	82·6	85·3	84·5	13·5	12	19	N.E.	N.	Ditto.	Ditto.	Ditto.
6		73·4	73·4	82 6	87·2	90	85·6	16·6	12	24	E. strong.	N.E.strong.	Ditto.	Ditto.	Ditto.
7		74·2	74·5	82·8	87·5	89·8	83·8	15·6	12.5	18	Ditto.	E.	Ditto.	Ditto.	Ditto.
8	☽	73·4	74	81·8	87·8	89	77·8	15·6	13	16	Ditto.	E. strong.	Ditto.	Ditto.	Ditto.
9		70	70·9	79	84·3	86	80·5	16	7·5	12	Ditto.	Ditto.	Ditto.	Cloudy.	Light clouds.
10		73·5	75	76·7	86	84·7	75·5	12·5	7	13·5	Ditto.	Ditto.	Ditto.	Sunrise, Thunder storm & light rain	Thunder storm, with rain, 7 P. M. to 10 A. M.
11		65	66·6	72	77·4	80·4	73·4	15·4	3.5	11	Ditto.	N.E. light.	Ditto.	Cloudy.	Light clouds.
12		63	63·7	78	82·2	85·2	80	22·2	9.5	20	N.E. light.	N.W.	Lt. dew	Clear and fine.	Clear and fine.
13		71·8	72·2	81·1	85·7	88·6	80·8	16·8	11	18	E. strong.	N.E. light.	Fine.	Ditto	Ditto.
14	○	72	72·2	82·9	88	90·3	84	18·3	12	20	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
15		74·6	74·8	83·2	89	89·5	82·9	14·9	9	14	E.	N.E.	Ditto.	Ditto.	Ditto.
16		75·8	76·1	85	,,	89·8	84·5	14	16	20	N. light.	W.N.W.	Ditto.	Ditto.	Light clouds.
17		70	70·4	84·7	87	88	80·1	18	16	20	N.	W.N.W.	Ditto.	Clear and fine.	Clear and fine.
18		70	71	83·1	86	87·5	82·7	17·5	17	20	W.N.W. light	W.N.W. strong.	Ditto.	Cloudy.	Cloudy.
19		73	73·7	84·7	88	88·7	84·9	15·7	16	20·5	W. strong.	W.	Ditto.	Light Clouds.	Cloudy.
20		76	76	85·7	87·5	89·7	84	13·7	15	20	W.N.W.	W.N.W. strong.	Ditto.	Ditto.	Ditto.
21	☾	73	74·9	85·2	89	90·8	,,	17·8	13	21	E.N.E.	W.N.W.	Ditto.	Clear and fine.	Light clouds. [to 8½ P.M.
22		74·3	74·5	82·2	88	90·2	71·5	15·9	9	16	E. strong.	N.E.	Ditto.	Ditto.	Thunder storm & rain 6½
23		67·7	68	77·5	82·7	86	80·7	18·3	7	12	E.S.E.	E.N.E.	Ditto.	Ditto.	Clear and fine.
24		71·5	71·8	81	85·8	86·7	85	15·2	7	14·5	E. strong.	W.N.W. light.	Ditto.	Ditto.	Ditto.
25		73·5	74	82·5	88	88·8	83	15·3	8	18	Ditto.	W.N.W.	Ditto.	Ditto.	Ditto.
26		75·7	75 7	84·4	89.4	90·4	83[illegible]	14·7	9·5	20	N.E.	Ditto.	Ditto.	Ditto.	Light Clouds.
27		74·3	75	83·4	88	90	83·7	15·7	7	21	E. strong.	Ditto.	Ditto.	Ditto.	Clear and fine.
28		75	75	82·7	88·4	89·5	85·7	14·5	9	22·5	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
29	●	75·3	75·7	82·2	87	90·4	83·8	15·1	8·5	16·5	Ditto	N.E.	Ditto.	Ditto.	Ditto.
30		74	75	83	87·8	90·3	86·8	16·3	8	13·5	E.	N.E.	Ditto.	Ditto.	Ditto.
Mean		71·3	71·8	81·4	85·7	87·6	81·3	16·4	11	18·4					

Mean.
- Minimum .... 71·3
- Medium .... 81·3
- Maximum .... 87·6
- Of all Observations .... 79·8

S. M. Ll.

Dinapore, 1st April, 1843.

THE

INDIA REVIEW.

MAY.] —o— [1843.

BIOGRAPHICAL SKETCHES.

Captain G. St. P. Lawrence.

(WITH PORTRAIT.)

The object of all Biography, even when we select the lives of those who have become prominent in the various classes of society for actions of which the character warrants the record, is, unquestionably, to represent without favor or affection the conduct, taste, habits, and pursuits of men, who, guided by a lofty principle of rectitude achieve success and distinction, and therein serve as examples to their fellow creatures. It is not often, indeed, that we meet with delineations of persons whose career has been no other than a tissue of inconsequence or vice; and the reason is obvious,—such people offer but little for incitement in others, morally considered, while as little proper amusement or interest can attach to the relation of their errors, unless the mind of the reader is prepared by depravity for the enjoyment of it. Thus, Biographers naturally fix on the actions of the good and the great,—less for the sake of holding up life as it but too often is, than for that of developing what it *should* be. Again, a man is not necessarily great because chance forces upon him some act which insures celebrity, as he is not necessarily good, because he stands committed to a single instance of benevolence. We can only say of such, that they are not altogether little, nor altogether bad. It is an untiring constancy of purpose, founded upon principle and pursued without deviation, that marks him who merits the appellation of being an example to his kind. It is that unbending determination to be true to oneself, whether the motive be important or insignificant,—and that desire upon all occasions to make honesty the standard of life, and honor and virtue its supporters,—which stamp the genuine worth of any individual, and become as it were the points of his trial, and the test whereby his value is to be recognized. To some men (assuming that they start with equal disposition to do only what is right, whether applied to morals or ambition) fortune seems more particularly partial in the opportunities she affords for a full display of their various excellencies. While many of perfect probity are doomed to pass, innocuously indeed but almost unknown, through the stages of existence, others, lapped, as it were, in the smiles of the fickle goddess, rejoice in multitudinous instances for erecting the pedestal of their own fame, and become known to society not from any greater inherent worth, perhaps, but from the happier causes which have led to its illustration. At best the human mind is an amalgamation of good and evil, and this or that predominates, as moral restraints,—imposed by conscience, by the laws of association, or by self approbation,—are more or less exercised. To perfect greatness, high place and responsibility seem essential;

since without the first the scope for action is too limited, and without the last the praise derived from it can never be wholly appropriated; but though we may perceive the attainment has not been entire in the progress of acquiring an imperishable name, because the period of life, of standing in society, professional rank, and, possibly, want of full experience, are just so many temporary impediments to it, we may easily ascertain the *germs* of an excellence which only requires time to produce both their fulness and maturity. This last observation applies, we think, with peculiar force to the subject of our present brief sketch. We have little difficulty in saying, if his life be prolonged, he will one day become a bright sample of the high character to which the officers of our Indian Armies are, generally, entitled.

George St. Patrick Lawrence is the third son of the late Colonel Alexander Lawrence of H. M. Army. He was appointed a Cavalry Cadet on the Bengal establishment on the 5th of May 1821, and landed in Calcutta on the 11th of September of the same year. He was immediately posted to the 2nd Regiment which he joined in January 1822. After serving with his Corps for nearly three years and a half he was appointed Adjutant, and continued to hold that situation till the promulgation of Lord William Bentinck's order (taking troops from regimental staff) in September 1834, caused him to resign his post in preference to giving up his troop. He accompanied his regiment with the first expedition to Affghanistan, and was present in the Bengal division of the Army, throughout Lord Keane's campaign of 1838—39— being frequently selected, during its progress, by Major General Sir W. Cotton, Sir J. Thackwell, and the late Brigadier Arnold of H. M. 16th Lancers for particular and arduous duties, requiring activity, courage, and enterprize. At the late Sir Henry Fane's suggestion, Sir J. Thackwell offered him an A. D. C. ship on his staff. Brigadier Arnold also tendered him the Major of Brigadeship to the cavalry brigade, but—as thinking it the best school for a young officer—he preferred remaining with his regiment. He was present at the storm and capture of Ghuznee, and was selected, without a dissentient voice, as one of the army prize agents by the Bengal column. He volunteered, with fifty of his troopers to accompanying the party sent in pursuit of Dost Muhummud. The unsuccessful result of this attempt is known to have been owing to the treachery of Hajee Khan Kaukur. The detachment under Captain Outram, having suffered considerable hardship, was at length compelled to return to Cantonments, after a harrassing and fruitless endeavour to overtake the fugitive. We annex a diary of the pursuit as it is given in the words of the subject of this memoir.

"August 3rd, 1839.—Accounts received of the flight of Dost Mahomed towards Toorkistan; two thousand Affghans, under Hajee Khan Kauker, to go in pursuit forthwith, and the following British officers volunteered to accompany the party: Capt. Outram, commanding, Captns. Wheler and Lawrence, 2nd, light Cavalry; Capt. Backhouse, Artillery; Capt. Troup and Lieut. Broadfoot, Shah's service; Capt. Erskine, Poonah Horse; Lieut. Hogg, Bombay Infantry; and Lieut. Byers and Dr. Worrall, 4th Local Horse. With Captains Wheler and Lawrence were fifty of the 2nd Cavalry, with Lieut. Byers twenty-five of the 4th Local Horse, and with Capt. Erskine 25th Poonah Horse.

We were ready to start, and at the Envoy's tent, by noon; we were then told to return to our tents till four P. M., at which hour we moved to the mission camp,

waited till dark, when about five hundred Affghans joined us, three hundred well mounted and armed, and the rest on yaboos (ponies), &c. A hundred and twenty five of Christie's horse under that officer, joined us to make up in some degree for the deficiency of Affghans. Hajee Kauker at starting advised us to take the high road by Mydan, which was overruled by Outram, and into the mountains we dived, marched all night, crossing several ranges of hills, and winding along the dry beds of rivers and perfect goat paths in many places. Halted occasionally, to let stragglers close up. 4th. At seven A. M. reached Goda, a small village in a confined but lovely valley, computed distance thirty two miles. About one hundered Affghans up with us, the remainder dropped in by sixes and sevens, loaded with plunder of all sorts. Marched at 5 P. M.; the Hajee unwilling to move, talked of bad roads and dangerous precipices, and we at once perceived that he had no heart in the cause. Road very bad, along the channels of mountain streams, and over high hills. After ten miles laid down by our horses till the moon rose. 5th. At two A. M. started and carried on till seven o'clock; crossed the Pughman range, a lofty and stony pass; encamped at Kalee suffied, a petty village. Nothing for the men to eat but parched grain. Not fifty Affghans reached the ground with us, but they tumbled in during the day. Heard of Dost-Mahomed being at Youk, one march ahead of us. The Kauker begged that we would halt and send for reinforcements stating that the Dost had two thousand select horsemen with him. Outram ordered the march at 4 P. M. Mustered the Affghans, now amounting to seven hundred and fifty, but most of them badly mounted, and got off after much difficulty and altercation, full of the idea of overtaking the Ameer by gun fire next morning. Our Hindoostanees were plucky and in high spirits. We had not, however, got many miles, when, after crawling down a precipitous mountain, we descended into a sort of punchbowl and a cry rose from the front that the guides were *goomshud*, 'lost.' The night was pitch dark, and so there was no help for it, but each to lie down on the spot where he stood, first planting videttes, to keep a look out, and a most comfortless bed we had, with large stones for our pillows; there we remained till day broke. 6th. At day break started for Youk, and only reached it at 7 A. M. Far off the Affghans, and nothing would induce Hajee Kauker to advance on to Hurza, sixteen miles, where we were told the Ameer was halting. He, however solemnly promised to go on in the evening, if we would wait till then. To this we were obliged to agree. At four the Cavalry mounted, but not an Affghan in the saddle, and after all, nothing would induce the Hajee to budge that night; so we dismounted angry enough, as the delay would prevent all chance of our coming up with the Dost. Outram remonstrated strongly with the Hajee, who at last promised to make a double march the next morning, but talked of the folly of the pursuit,—that we would be unequally matched, Dost Mahomed having treble our number of men, with fresh horses, and himself and followers fighting for their families and lives. The reply was that we had to perform our duty, and that every thing possible *must be done.*

7th. Marched at day break, and on arriving at Hurza, found the traces of the Ameer's yesterdays encampment. The Hajee halted, declaring that his men were famished and done up, and tried to pursuade us to do the same, but we pushed on. A mile further met some deserters from the Dost's party, who told us they had left him at Keloo early in the morning, and that he had no idea of moving. Capt. Outram rode back to inform the Hajee and urge him to come on, but no, nothing would have any effect; he declared we were mad, running our neck into destruction; that if we encountered him, not a man would survive to tell the tale, and that disgrace would fall upon the Shah. Outram told him that on we would go, and if the Ameer was at Keloo, we would attack at all hazards, and if we did not succeed, he might look to his head. We arrived at Keloo, 3 P. M., found the Dost had left some hours before, and by that time must have surmounted the pass, the highest of the Hindoo Koosh. It was useless, therefore, following him; the men and horses required rest, night was at hand, and no signs of our Affghan allies, all of whom remained with Hajee Kauker. We had been nine hours on our saddles. 8th. This morning we were joined by Capt. Taylor, European regiment, and Trevor, 3rd cavalry, with fifteen troopers of the Bombay 1st cavalry, and fifteen of the Bengal 3rd, and about three hundred Affghans. This accession of force induced the Kauker to come on, but no sooner had he arrived than he resumed the old story of halting for more troops and the danger of pursuing desperate men. He said that not one Affghan would fight against Dost Mahomed, but probably against us. Outram's reply was, that we had come to intercept the Ameer,

and do it we must, if possible, and that if the Affghans did not fight, they must answer for their conduct to the king. The Hajee, finding words of no avail, imploringly took off his turban and laid hold of the skirt of Outram's coat, begging that he would not advance; but off went Outram and all our party. We had not got half way up the pass before we saw the Hajee slowly following, as if ashamed of his conduct, the ascent of this pass was so steep, that we dismounted and led our horses for a mile or more—the descent less abrupt, a deserted village at the foot. Halted to allow stragglers to join, and rest the wearied cattle. Outram here informed the Kauker that he would mount at 2 P. M., and push on to Bamian; and again the Kauker implored him to be cautious, saying, besides, that his Affghans would not march at night, and begged to remain till day break, as our horses were pretty well done up. This was at length acceeded to; but two officers proceeded at 3 A. M. to reconnoitre Bamian. 9th. Just as we were mounting, information came that Dost Mahomed, instead of stopping at Bamian, had passed on the forenoon of yesterday (having sent his family in advance) and that to day he would be at Syghan, forty miles beyond the limit of the Shah's country, and tomorrow at Kemard, under the protection of the Waly. Outram then told the Hajee, if this proved true, he should be answerable to the Shah with his head for the Dost's escape. On our arrival at Bamian, twelve miles, found seventy horsemen who had been dismissed by the Dost, and who confirmed the report, as well as two of the mission spies, who were here, they said he had two thousand men of all sorts with him, and that his sick son Akber was so much recovered as to mount an elephant. We were thus reluctantly compelled to give up the chase, and halted three days. Before closing this brief sketch I would mention, in the highest terms, the conduct of our Hindoostanee troops, both regulars and irregulars. Nothing could exceed the patience, fortitude and good humour with which they underwent great fatigue and constant exposure. *The Brahmin and Rajpoot vied with the Mussulman in making a joke of their difficulties and privations, and when it is known that the clothes on their backs were all the covering they had for fifteen days with not a cooking utensil among them, too much praise cannot be given them. And yet it is the fashion to say our native soldiers are not what they used to be* * *!*"

Having reached the capital, the late Sir Wm. Macnaghten immediately appointed Captain Lawrence one of his political assistants, bestowing, at the same time, temporary command of his escort, and subsequently he nominated him his military secretary, a post which he filled with great distinction from January 1840 to the death of his patron on the 23d of December, 1840. We shall gather from the sequel in what estimation his services were held by all parties competent to form an opinion respecting them. Captain Lawrence was present with Sir William on the surrender of Dost Muhummud, and the Ameer was placed under his charge till the period of his departure for Hindoostan. Although not directly appertaining to the work in hand, the following quotation is so full of interest and so intimately connected with the duties devolving on the subject of our sketch, we feel great pleasure in making the extract from a conviction of the satisfaction it will afford to our readers. After commenting on the unfortunate affair of Purwan-Durrah, Dr. Atkinson, in his memoir of the expedition, observes—

"This was a most melancholy occurrence, and its probable consequence, as far as was then known or calculated, the rising *en masse* of the whole of Kohistan. This impression forced itself strongly on Sir A. Burnes. The Dost was supposed to have fallen back to Nijrow, and notwithstanding the punishment already inflicted on the chiefs by the signal destruction of their forts, it was apprehended that their hopes would be immediately revived by our disaster at Purwan. In this desponding spirit, justified no doubt by the pressure of circumstances, Sir Alexander Burnes wrote to the Envoy and Minister, and strongly advised that all the troops should be at once concentrated at Caubul, and there be prepared to

* The expedition into Affghanistan; notes and sketches, &c. By James Atkinson, Esq.

resist the enemy. But happily the most melancholy forebodings, forced as they may be on the mind by disaster and disappointed hopes, are sometimes dispersed in an extraordinary way.

The event just recorded took place on the 2nd of November. On the evening of the 3rd, whilst taking his ride, the Envoy and Minister received the alarming communication made by Sir A. Burnes, which naturally produced in him a corresponding impression of gloom. He was, in this depressed state of mind proceeding homewards, accompanied by two or three officers, and within fifty yards of the gate of his residence, when a horseman passing his escort and the gentleman with him, rode suddenly up to him, and said "Are you the Envoy ?" —"Yes, I am the Envoy." "Then" rejoined the horseman, "here is the Ameer." —"What Ameer ? Where is he ?"—"Dost Mahomed Khan !" was the reply. The surprise, and amazement of Sir William Macnaghten at this announcement may be readily conceived, and in an instant afterwards he beheld the very ex-Chief himself alighting from his horse and claiming his protection. The whole scene was truly electrical. The Dost was requested to remount, and ride on to the gateway, where both alighted. The Envoy then took his arm, and led him through the garden up to the house, saying, "why have you persevered so long in opposing our views, and subjecting yourself to so much vexation and anxiety, aware as you must be of the good faith and liberality of the British Government, as well as of its power ?" But his only reply was, in the true Asiatic spirit—"that it was his fate ! he could not control destiny !" Arrived at the house, and seated in the very room where, a year before, he was "monarch of all he surveyed," the voluntary prisoner delivered up his sword into the hand of the Envoy, observing, that he had now no further use for it ; but the Envoy, with becoming generosity, begged him to keep it.

I was at the mission at the time, and the volubility with which the ex-Ameer conversed, and the remarkable self possession he displayed under circumstances certainly embarrassing, surprised me. His first inquiry was after his family, and he almost immediately requested that a Moonshee might be sent for to write some letters, which he dictated with precision and distinctness, correcting words, as the moonshee proceeded, like a man accustomed to business. These letters were to his sons. The first to Mahomed Afzul Khan, in Nijrow, requiring him to hasten forthwith to Caubul, he himself, he said, having been received and treated most kindly, most honourably. He had not his seal with him, and therefore, to satisfy his son of the authenticity of the letter, unbound a string from his waist, to which was fastened a small clasp knife, which, he observed, would be recognised at once. He also dictated letters with the same view to his two sons, Azeem Khan and Sheer Ali Khan, who had made their escape from Ghizni on the 23rd September, and had taken up their quarters in Zoormut, in the fruitless expectation of collecting followers.

Having finished his despatches, he conversed freely, and in the most familiar manner with the Envoy. His countenance, however, was haggard and care-worn, denoting the hardships he had undergone ; but a bright eye animated his features, and diffused over them a rather pleasing expression. Yet I was disappointed in his general appearance, for report had presented to my imagination a very different man ; tall, rather spare, and handsome. He is on the contrary, robust and large-limbed ; his nose is sharp and aquiline ; his eyebrows are highly arched, and his forehead falls back at a striking angle. His moustaches and beard are grey. They had not been dyed he said, afterwards, from the time he quitted Caubul. The latter had been long and sweeping, but from want of proper attention during his imprisonment at Bokhara, and the late struggle, a great part of it had fallen off. "Why" said he to the Envoy "they told me you were an old man" but I do not think so : how old are you ?" "nearly fifty" "Ah" he replied "that is just my age." But the Dost is nearer sixty*.

He acknowledged to have been in the fight, but he had, he said, previously determined to surrender himself, and rode off with four horsemen, none of his adherents, whom he left, knowing whither he had gone, except Sultan Mahomed Khan ; and we may fully believe his assertion, as the conduct of the two squadrons of the 2nd cavalry, chased as they were from the field, had no effect in changing his mind. He doubled round our camp at some distance, passed along by unfrequented paths over the mountains and through the valleys, and after

* [We have reason to believe that Dr. Atkinson is in error, and that the Ameer told the truth.]—*Ed:*

having been twenty-four hours on horseback, arrived at Caubul, between five and six o'clock in the evening. He cautiously avoided the city, pushed his beard under his chin, and held it there by a fold of his turban, which also half covered his face, to prevent being recognised. He passed near cantonment, and by a fortunate concurrance of circumstances, he was not encountered by any of the Shah's people, from whom, assuredly he would have had no mercy, but arrived, without the least interruption, in the neighbourhood of the Peshwar gate, at the time the Envoy was returning from his ride to the Ballah Hissar. He followed at a distance, was challenged by the sentries at the gate; but declaring himself a courtier with despatches from the Kohistan, he was allowed to go on. He moved forward through the bazaar street, and by the new barracks, and then, well knowing every turn of the locality, despatched the horseman to announce his coming to the Envoy. The horseman was no other than Sultan Mahomed Khan, the notorious chief, who had long been stirring up the people of Nijrow to rebellion. He took the same opportunity of surrendering himself to the Envoy, and was allowed to accompany the messenger, to point out the place were Mahomed Afzul would be found. He did so, but remained in Nijrow, whilst Afzul came in immediately to Cabul*.

Dost Mahomed had not been long seated, when several of the Affghans belonging to the mission, and old acquaintances of the ex-chief, came into the room, *sans cérémonie*, and, demonstrating the "hail-fellow well-met" system of the country, successively grasped his hands, and familiarly congratulated him on the wisdom of this last act. Moolah Ismut Allah, Akkond-Zadah, was eloquent in praise of the step that had been taken, and Sheer Mahomed, noted as the fleetest mounted messenger in Affghanistan, displayed equal gladness at meeting his old friend, and with a strong pressure of the hand equally applauded him for coming in. Ah, Ameer, you have done right at last. Why did you delay putting an end to your miseries?"

The cordiality of the meeting of these parties together was mutually expressed, and the Dost certainly looked like a man who had got rid of his difficulties, and accomplished an object calculated to secure his future peace and welfare.

On the breaking out of the insurrection in Cabool, Captain Lawrence was sent with a message, on the morning of the 2nd of November, from the envoy to the King, and narrowly escaped with life in the execution of his task. On the same day he volunteered to lead two companies of Infantry, with ammunition, for the purpose of reinforcing the garrison of Captain Colin Mackenzie's fort in the heart of the city, but the project was laid aside in consequence of the risk it was considered to involve. A consultation being held on the first day as to what was necessary to be done under the exigences of the case, he strongly urged the advantage of attacking the city, making re-iterated remonstrances thereupon to General Shelton. It is now pretty well known that the envoy laid down three bold propositions, for the decision of the military counsel, of which the first was a move into the Balla Hissar, there to await the return of spring and the additional strength it was sure to produce by the march of sufficient succours from our provinces. The second, by a successful storm of the city at once to crush the rebellion. The last, and more desperate remedy, being, to cut the way, sword in hand, to Sale's force at Jullalabad. It is needless to dwell upon the melancholy termination of the business, as the world is already made acquainted with the vacillating character of the chiefs, and the absolute want of moral nerve that was displayed. Captain Lawrence accompanied Sir William in all his interviews with the rebel chiefs, and was one of the earliest hostages they demanded. To Sir William's reply to this requisition—

* He arrived on the 9th and was then deputed to Ghizni, to bring on the women of the family.

"any one but him; if you take him you deprive me of my right hand," he mainly attributes his salvation, as the chiefs were naturally impressed with an assurance of his being a man of much consequence, and hence never rested till they secured him as a hostage. On the day of the Envoy's barbarous assassination he, together with Captains Mackenzie and Trevor, having gone in the suite of his excellency to confer with Muhummud Ukhbar Khan, was the first seized and carried off by one of the ringleaders in that infamous transaction, his official narrative of which, in a letter to Major E. Pottinger, we herewith subjoin:—

(From Lieut. Eyre's narrative.)

SIR,

In compliance with your request I have the honour to detail the particulars of my capture, and of the death of my ever-to-be-lamented chief.

On the morning of the 23rd December, at 11 A. M., I received a note from the late Sir W. H. Macnaghten, warning me to attend, with Captains Trevor and Makenzie, an interview he was about to have with Sirdar Mahomed Akber Khan. Accordingly, with the above named officers, at about 12, I accompanied Sir William, having previously heard him tell Major-General Elphinstone to have two regiments of infantry and two guns ready for secret service. In passing through cantonments, on my observing that there were more Affghans in cantonments than usual, or than I deemed safe, the Envoy directed one of his Affghan attendants to proceed and cause them all to leave, at the same time remarking, how strange it was that although the General was fully acquainted with the then very critical state of affairs, no preparations appeared to have been made, adding, "however, it is all of a piece with the military arrangements throughout the siege." He then said, "there is not enough of the escort with us," to which I replied, that he had only ordered eight or ten, but that I had brought sixteen, that I would send for the remainder, which I accordingly did, asking Lieut. Le Geyt to bring them, and to tell Brigadier Shelton, who had expressed a wish to attend the next interview, that he might accompany them. On passing the gate, we observed some hundreds of armed Affghans within a few yards of it, on which I called to the officers on duty to get the reserve under arms, and brought outside to disperse them, and to send to the General to have the garrison on the alert. Towards Mahmood Khan's fort were a number of armed Affghans but we observed none nearer.

The Envoy now told us that he, on the night previous, had received a proposal from Sirdar Mahomed Akber Khan to which he had agreed, and that he had every reason to hope it would bring our present difficulties to an early and happy termination; that Mahomed Akber Khan was to give up Naib Ameenoollah Khan as a prisoner to us, for which purpose a regiment was to proceed to Mahmood Khan's fort, and another corps was to occupy the Bala Hissar. Sir William then warned me to be ready to gallop to the King with the intelligence of the approach of the regiment, and to acquaint him with Akber's proposal. On one of us remarking that the scheme seemed a dangerous one, and asking if he did not apprehend any treachery, he replied, "dangerous it is, but, if it succeeds, it is worth all risks; the rebels have not fulfilled even one article of the treaty, and I have no confidence in them, and if by it we can only save our honour, all will be well; at any rate, I would rather suffer an hundred deaths, than live the last six weeks over again."

We proceeded to near the usual spot, and met Sirdar Mahomed Khan, who was accompanied by several Gilzie chiefs, Mahomed Shah Khan, Dost Mahomed Khan, Khoda Bux Khan, Azad Khan, etc. After the usual salutations, the Envoy presented a valuable horse which Akber had asked for, and which had been that morning purchased from Capt. Grant for 3,000 rupees. The Sirdar acknowledged the attention, and expressed his thanks for a handsome brace of double barrelled pistols which the Envoy had purchased from me, and sent to him with his carriage and pair of horses, the day before.

The party dismounted, and horse clothes were spread on a small hillock which partially concealed us from Cantonments, and which was chosen, they said, as being free from snow. The Envoy threw himself on the bank with Mahomed Akber

and Captains Trevor and Mackenzie beside him; I stood behind Sir William till, pressed by Dost Mahomed Khan, I knelt on one knee, having first called the Envoy's attention to the number of Affghans around us, saying that if the subject of the conference was of that secret nature I believed it to be, they had better be removed. He spoke to Mahomed Akber, who replied, "no they are all in the secret." Hardly had he so said, when I found my arms locked, my pistols and sword wrenched from my belt and myself forcibly raised from the ground and pushed along, Mahomed Shah Khan, who held me, calling out, "come along if you value your life." I turned, and saw the Envoy lying, his head where his heels had been, and his hands locked in Mahomed Akber's, consternation and horror depicted on his countenance. I could do nothing, I let myself be pulled on by Mahomed Shah Khan. Some shots were fired, and I was hurried to his horse, on which he jumped, telling me to get up behind, which I did, and we proceeded, escorted by several armed men who kept off a crowd of Ghazees, who sprang up on every side, shouting for me to be given up for them to slay, cutting at me with their swords and knives, and poking me in the ribs with their guns; they were afraid to fire lest they should injure their chief. The horsemen kept them pretty well off, but not sufficiently so to prevent my being much bruised. In this manner we hurried towards Mahomed Khan's fort near which we met some hundreds of horsemen who were keeping off the Ghazees, who here were in greater numbers, and more vociferous for my blood. We, however, reached the fort in safety, and I was pushed into a small room, Mahomed Shah Khan returning to the gate of the fort and bringing in Capt. Makenzie, whose horse had there fallen. This he did, receiving a cut through his neencha (Scother coat), on his arm which was aimed at that officer, who was ushered into the room with me much exhausted and bruised from blows on his head and body. We sat down with some soldiers who were put over us with a view to protect us from the mob, who now surrounded the house, and who till dark continued execrating and spitting at us, calling on them to give us up to be slaughtered.

One produced a hand (European) which appeared to have been recently cut off; another presented a blunderbuss, and was about to fire it, when it was knocked aside by one of our guard. Several of the Sirdars came in during the day, and told us to be assured that no harm should befall us; that the Envoy and Trevor were safe in the city (a falsehood, as will afterwards be seen). Naib Ameenoolah Khan and his sons also came. The former, in great wrath, said that we either should be, or deserved to be, blown away from a gun. Mahomed Shah Khan and Dost Mahomed Khan begged he would not so talk, and took him out of the room. Towards night food was given to us, and postheens to sleep on: our watches, rings, and silk handkercheifs were taken from us; but in all other respects we were unmolested. The followers of Mahomed Shah Khan repeatedly congratulated him on the events of the day, with one exception, viz. an old Moollah, who loudly exclaimed that, "the name of the faithful was tarnished, and that in future no belief could be placed in them; that the deed was foul, and could never be of advantages to the authors." At midnight we were taken through the city to the house of Mahomed Akber Khan, who received us courteously, lamenting the occurrences of the day: here we found Capt. Skinner, and for the first time heard the dreadful and astounding intelligence of the murder of the Envoy and Captain Trevor, and that our lamented chiefs head had been paraded through the city in triumph, and his trunk, after being dragged through the streets, stuck up in the Char Chouk, the most conspicuous part of the town. Captain Skinner told us, that the report was, that on Mahomed Akber Khan's telling Sir William to accompany him, he refused, resisted, and pushed the sirdar from him; that in consequence he was immediately shot, and his body cut to pieces by the Ghazees; that Captain Trevor had been conveyed behind Dost Mahomed Khan as far as Mahomed Khan's fort, where he was cut down, but that his body was not mangled though carried in triumph through the city. On the following morning (24th) we (Captain Skinner, Mackenzie and self) were taken to Newab Zuman Khan's house escorted by Sultan Jan and other chiefs, to protect us from the Ghazees; there we met Captains Conolly and Airey (hostages) and all the rebel chiefs assembled in council. The Envoy's death was lamented, but his conduct severely censured, and it was said that now no faith could be placed in our words. A new treaty however was discussed, and sent to the General and Major Pottinger, and towards evening we returned as we came, to Mahomed Akbar's where I remained a prisoner, but well and courteously treated, till the morning of the 26th, when I was sent to Naib Ameenoolah Khan. On

reaching his house I was ushered into his private apartment. The Naib received me kindly, shewed me the Envoy's original letter in reply to Mahomed Akbar's proposition, touching his being made Shah Soojah's Wuzzer, receiving a lack of rupees on giving the Naib a prisoner to us, thirty lacks on the final settlement of the insurrection, etc. To this the Naib added, that the Envoy had told Mahomed Akber's cousin, that a lac of rupees would be given for his (Ameenoolah Khan's) head. I promptly replied "'Tis false," that Sir William had never done so, that it was utterly foreign and repugnant to his nature, and to British usage. The Naib expressed himself in strong terms against the Envoy, contrasting his own fair and open conduct with that of Sir William. He told me that General Elphinstone and Major Pottinger had begged I might be released, as my presence was necessary to enable them to prepare bills on India, which it had been arranged the Sirdars were to get. After some delay, consequent on my asking Captain Mackenzie to be released with me, and Mahomed Akbar's stoutly refusing the release of either of us, I was sent into Cantonments on the morning of the 29th, escorted by the Naib's eldest son and a strong party of horse and foot, being disguised as an Affghan for my greater protection. I must here record that nothing could exceed the Naib's kindness and attention to me while under his roof.

I have &c. &c.
G. St. P. LAWRENCE.
Military Secy. to the Envoy and Minister.

Camp Zoudah, Ten miles S. of Tezeen.
10th May, 1842."

General Elphinstone and Major Pottinger, having represented that the business of the Mission could not go on without him, Capt. Lawrence was released by the arch-villain Ameenoollah Khan, and sent back to Cantonments, not however until he had been compelled to name the hostages who should remain at Cabool.

On the evacuation of Cantonments, 6th of January 1842, Captain L., with the cavalry and infantry escort, took charge of all the Ladies and children attached to the force, with whom he remained on this protective duty till sent over as a hostage on the morning of the 8th, by General Elphinstone, to Muhummud Ukhbar. On that very morning he, with the cavalry portion of the escort, aided the late Major Thain in driving off masses of the enemy who had made an early attack on the camp, and he represents that up to the last moment of his acting with them, the escort stood firm and declared themselves ready to attempt anything.

After becoming a hostage, he remained with the rest of the British captives in Ukhbar's power till September 1842, when, as is well known, the prisoners, through their own means, liberated themselves by buying over their keeper Saleh Muhummud. Captain L. was employed by Ukhbar Khan as the medium of communication with his fellow captives, and it was his immediate province to serve out the allotted quantum of provisions, cloths, &c. Ukhbar facetiously remarking, he could never have been able to keep so many ladies in order without his assistance, as he seemed to understand them better than any other of the Sahib logue.

On the arrival of the Captain in the British camp, Sir George Pollock appointed him to the charge of the Ex-Kings of Caubool, on their return to India, for undertaking which the Governor-General was pleased to award him the pay and allowances of an A. D. C.

Captain Lawrence has actually served in India two and twenty years, less one month, and he is still so unfortunate as to be a regimental Subaltern. For the ten months he was a hostage, Government granted him pay and half Batta, or 170 Rs. monthly, less by 135 than he received the first day he landed in India. As Military Secretary to

the late Envoy, he drew a salary of 1200 Rs. per mensem ; and thus all that he has obtained by becoming a surety for his brethren in arms has been, a great privation of personal allowance in addition to the anxieties and sufferings endured in captivity. No comment is needed, this being one of the few instances wherein the judgment and generosity of Lord Ellenborough have, to our thinking, been utterly at fault.

As proof of the estimation entertained of Captain Lawrence's services, we have been kindly permitted to extract the following passages from the Envoy's written communications :—" My dear Lawrence,—There is no one with whom I have ever been associated, whether in a public or private point of view, with whom I more regret to part, &c. ;" and in a letter to Government dated 27th of October, 1841, he says, " The active and zealous exertions of Captain Lawrence, my Military Secretary, I have ever found most valuable, and I have already represented that his health has given way in consequence of his unremitting assiduity in the discharge of the duties of his office during a difficult and trying period." In reference to the above, the late Sir Alexander Burnes thus writes :—" My dear L., I do in truth assure you, that to every word of the Envoy's letter now returned, I say amen. I have not been associated with any one who has fixed a more favorable opinion of his fitness and efficiency in his calling than you."

Much has been said, and justly said, of the treachery of Muhummed Ukhbar Khan. The expression of this opinion will at once declare that we are by no means the advocates of the Caubool Sirdar or the apologists of his conduct, but we may safely quote the old adage that there is no necessity for painting even the devil blacker than his nature has made him. Captain Lawrence gives us the following instance of rude courtesy and determination to protect the captives. On the occasion of having been abused by an Affghan he reported the same to the Sirdar, who instantly visited on the offender a sound castigation and quietly demanded of the Captain whether it would afford him any satisfaction to be the possessor of the culprits ears. Rough and barbarian-like as the treatment was, it still smacked of so much generosity as that it evinced a determined disposition to protect misfortune from insult, which was more strongly confirmed by a threat that the menace should be carried into execution upon any one guilty of similar misbehaviour towards the prisoners. Again, in the spoliation which ensued on the commencement of the retreat, and continued uninterruptedly to the moment of capture, Captain Lawrence was deprived of all his property with the exception of a solitary pencil case. Covetousness of other mens goods appears to form a prominent ingredient in the composition of an Affghan, from which the highest classes are not exempted ;—Ukhbar fixed his eye upon the pencil case and requested Captain Lawrence would present him with it. This occurred frequently, but the invariable answer was that as peculiar associations were connected with the possession he could not *give* it. " What if I take it?"—" Of course all power is in your hands and it rests with you to exercise it or refrain, and to your consideration I leave the fact of your strength and my weakness." With a smile that assented to the force of the appeal the conversation was dropped, and the pencil remained in the keeping of its owner.

Captain Lawrence has obligingly favored us with a few anecdotes of

the people amongst whom he was cast, descriptive of their bearing and the mode in which they conducted themselves when addressing their prisoners. A man endeavoured to take the turban from the Captain's head and seemed perfectly astonished that the attempt was answered by defiance. "Are these our prisoners?—you still fancy yourselves princes in the land!"—"So we are and your Rulers know it."—"And yet it remains with us to annihilate you."—"Aye, you can kill us but once, though, and you know better than to dare it."—The Affghan was silenced and the honors of the head were preserved.

According to the information afforded us it would appear that the chiefs were greatly wanting in that hardihood which forms constitutional bravery. They were suspicious of each other, and seemed rather to be watching for examples of flight from danger, than opportunities of inciting others to the post of it. Their position was invariably in rear of the combatants. They had the cold-bloodedness to direct the butchery coupled with the caution that kept their own persons within the limits of security.

Captain Lawrence is of opinion Ukhbar Khan would have sold the prisoners into hopeless bondage could he at the time have carried them further, after his last defeat by General Pollock,—as it was, their liberation was effected solely because their custodian, supposed to be a creature of Ukhbar's, was not proof to the influence of money where he saw nothing but a losing game in prospect for his superior. The prisoners could at any time have overpowered their guard, but they frankly told them that they would make no such attempt because they could never entertain the idea of leaving the ladies behind them, and saw no chance of escaping while they were in company. An instance occurred of the slight manner in which they were controlled, and the facility that now and then offered for individual liberation. In the *melée* of the retreat the horse of an officer became the prize of an Affghan. This man was attached to the party immediately present with Ukhbar Khan. It happened, while the Chief and one of his captives were conversing together outside the dwellings, the Affghan rode up and complained he could not make his horse leap a ditch or fence in the vicinity. "Oh, said the officer, I'll shew you the way if you will only let me mount him." This was agreed to, and the obstacle was cleared at a bound several times. "Now (observed the same officer) I have shewn you how to leap a ditch, and if you look further I'll shew you the way to Jellalabad!"—With the word he sprung over the impediment, leaving the party quite astonished, and after making a considerable detour quietly came back and dismounted.

Speaking of the hardships undergone, Captain Lawrence asserts that the prisoners were not more harshly treated than they would have been in the hands of any other power, and that in point of attendance they enjoyed some advantages for which generally speaking prisoners may vainly hope. For example, Lady Macnaghten retained two and twenty servants, and the Captain seven.—Supposing even a rational proportion, this would indicate that most had the benefit of other personal assistance than what was supplied by their captors. We have but loosely put together these items, obtained as they were during a brief interview and almost immediately previous to Captain Lawrence's departure from India; but have preferred to give them as

nearly as possible in the words of the narrator, to the concoction of a tale whose well-rounded periods might possibly have been more attractive. We may here take the opportunity of noticing Captain Lawrence's intention to publish a narrative of the Cabul events which, from his confidential situation cannot but prove highly interesting.

We started with remarking that not talent only, but opportunity was essentially requisite to the achievment of renown, which depended not alone on the exercise of talent and the seizure of opportunity, but still demanded station and scope for genius, before that point was obtained which is conventionally understood as greatness. To this maturity, several circumstances in the situation of Capt. Lawrence are just so many temporary interdictions; his rank forbids exertion in a higher sphere, and it is improbable that similar events will soon afford him fresh occasion for display: but—if from the germ, future excellence may be divined,—if in the elements of a man we find the one great promise of eventual celebrity—we hesitate not to declare our conviction that the mind of Capt. Lawrence is of a calibre to acquire high and permanent fame, and that if his life be spared and he enjoys the means of manifesting his qualities as a soldier and a diplomatist, we know of none more likely to fill a niche in the temple of fame, from amongst the mass of our gallant defenders, than the subject of this very brief and imperfect sketch.

ORIGINAL COMMUNICATIONS.

HISTORICAL RESEARCHES.

BY THE LATE LIEUT.-COL. W. R. POGSON.

(*Continued from page* 222.)

[Whilst preparing for the press the following portion of the 'Researches' by Col. Pogson we received the sudden and melancholy intelligence of his decease at Benares. There can be none to whom our talented and honoured contributor was known who will not lament with us, the loss which the service and society at large have sustained by his death. Honoured and respected by the corps to which he belonged, beloved in all the relations of life,—as a man, a Christian, a soldier, a father, and a friend, Colonel Pogson challenged and won that distinction in society which stamped him as "THE NOBLEST WORK OF GOD." We have known few whom we more highly esteemed,—still fewer whose loss we more sincerely deplore. May the memory of his virtues and his worth soften the affliction of those nearer ties from whom he has been removed.]—Ed.

In order to ascertain the regions inhabited by Gomer, the first son of Japhet, it is essential to begin with Magog, because the Scriptures treat more of Gog and Magog than of Gomer. The 38th and 39th chapters of Ezekiel explain what nations the Gomerians, Jubalines, Togormians and Magogians were; and that Gog was prince or chief of the latter.

Besides Europe and the north eastern parts of Asia, the 37th chapter

of Ezekiel shows that the descendants of Japhet inhabited Asia Minor, and foretells the reunion of Judah and Israel in these words 'And David my servant shall be king over them, and they shall have one shepherd.' The 38th chapter contains the prophecy against the nations that should oppose this union and endeavour to subdue the Israelites, expounding them to be the confederates of Gog, prince of the Magogians or Cœlesyrians, who dwelled on the border of Palestine and the other countries north of Judea. "Son of man, set thy face against Gog and against the land of Magog, the Chief Princes of Mesech or Mosoch and Tubal. Gomer and all his bands and the house of Togarma of the north quarter"*.

Ezekiel having delivered his prophecy, describes the nations who should in vain attack the Israelites. He unites them under their Prince Gog, and shews that they dwelled on the north of Judah. St. Jerome explains that in Hebrew, Gog means the roof or covering of a house : and Pintus, that it thereby metaphorically denotes anti-christ, as expressed in 'antichristus erit diaboli tegumentum sub specie humana.' Antichrist will be the covering of the Devil under a human form ; and adds that Magog is equivalent to Gog ; the first letter being the Hebrew preposition *of* or *from*, and he therefore assumes Magog to be the followers of Gog, and the appellation of a nation ; concurring therein with Beroaldus who observes that in Hebrew the word is sometimes written Hamagog, the letter *h* being prefixed for emphasis and the definite article, which is never applied to the names of men, but often to nations and places, hence he defines Magog to have been a nation of which Gog was the prince. Others explain it to mean a people. Ezek. xxxix. 1. shews that Gog was also prince of Mesech and Tubal 'Behold, I come against thee Gog, the chief prince of Mesech and Tubal.'

St. Ambrose and Isidore suppose Gog to designate the Goths ; perhaps because they invaded Europe and plundered Rome and other places.

Hermolaus Barbarus, citing Pomponius Mela, deduces the origin of the Turks from the Scythians, and the Magogians from Gog. Many suppose Gog the name of a man, others, of a region, and some of a nation inhabiting a region, as Junius, who asserts Gog to be the name of the nation named after him in the Greek stories Gyges, who having slain Candaules the Lydian, gave his own name to that nation, and hence the Gygean lake which Strabo† places in Lydia, of which Gyges was king. Pliny calls it Gygeum stagnum. Herodotus and Nicander place it about the rivers of Hyllus and Meander, but the difference is not great. Marius Niger mentions this Gyges king of Lydia having subdued the country about the river Rhodius which empties itself into the Hellespont, and called the promontory Trapese after his own name Gyges.

Junius affirms Magog to have been the part of Asia Minor possessed by Halyaltes, and after him by his son Crœsus, who conquered the regions as far south as Libanus, and built in Cœlesyria the city of Gog karta, signifying, in the Syrian tongue—the city of Gog, whose inhabitants were the ancient enemies of the Jews.

Pliny says, 'Cœlesyria habet Bambycen quæ alio nomine Hierapolis vocatur : Syris vero Magog': Cœlesyria has Bambyce, otherwise called

* Ezekiel xxxviii. 2, 6. † Strabo 1. 13.

Hierapolis; by the Syrians Magog—and describes it as having been notorious for the worship of the idol Atergatis, called by the Greeks Decerto. Lucian says the city had anciently another name, which he with-holds; thinking perhaps that Magog would be unharmonious to Grecian ears.

Strabo explains that Edessa in Mesopotamia was the Bambyce or Heliopolis where the idol was worshipped, that they were situated due north of Palestine, and that the same name and adoration were common to both places.

Magog may also have been the origin of the Scythians, because Gog is called the prince of Magog, meaning Cœlesyria and the adjoining north country. The opinion, therefore, of Hermolaus Barbarus, who adopts that of Josephus, is not improbable; because people by a later emigration, may have gone from those countries into Scythia; but it is undeniable that the Scythians anciently came from the north-east, wasted a great part of Asia minor and possessed Cœlesyria, where they built Scythiopolis and Hierapolis which they called Magog.

It is evident that Ezekiel referred to this Magog, because Hierapolis, or Magog, was due north of Judea, and he foretold that those nations should come from the north and attack the Israelites, as the kings of Egypt did from the south. Gulielmus Tyrius supposes Hierapolis to have been the Rages mentioned in Tobias: Pliny, that it was called Bambyce and Edessa, which is also named Aleppo; for it is so described by Bellonius who also terms it Magog. It was likewise designated the sacred city, though notorious for the worship of the mermaid Atergatis, or according to Pliny Atirgitis, and Decerto by the Greeks.

Ezekiel xxxviii. 3. mentioning together Gog, Mesech and Tubal; and Hierapolis having been the city of Gog termed Magog, situated north of Judea, with which he has connected Gomer and his bands, it may be inferred that they were the vassals of Gog and that they consequently could not have been the Gomerians of France nor the Tubalines of Spain, but of Cœlesyria and Asia Minor, and therefore the opinions of Berosus, Josephus and others are untenable. If Josephus however, referred to later times, it is by no means improbable that the Tubalines may have passed from Iberia and Asia into Spain, having previously migrated into the regions bordering on the Euxine.

Josephus mentions the Iberii having been anciently called Thobelos as derived from Tubal; and Justin that they passed into Spain in order to discover the mines in that country; having perhaps understood it to be a southerly and mountainous region, for it seems by the following verses of Apollonius that the race of Tubalines called Chalybes, exchanged Iron and other metals with the Iberii.

> Hæc gens tellurem rigido non vertit aratro;
> Sed ferri venas scindit sub montibus altis
> Mercibus, hæc mutat, quæ vitæ alimenta ministrant,
>
> The Chalybes plough not their barren soil;
> High hills they undermine for iron veins:
> And change the purchase of their endless toil,
> For merchandize, which humble life sustains.

The Carthaginians and Moors having possession of the southern

provinces of Spain near 800 years, and since their expulsion always manifested a desire to return, it seems most probable that it was first peopled by Africans, than that in the twelfth year of Nimrod, Tubal passed into that region and built the obscure town of St. Uval.

It is certain that Mesech and Tubal were neighbours, and that Gomer and Togarma were not far from them; because, Ezekiel describes Gog as the prince of Mesech and Tubal, and Gomer and Togorma as his confederates: and Functius, following Berosus, confesses Mesech to have dwelt in Asia; saying, "Mesacus qui a Mose, Mesech, priscos Miscos ab Adula monte, usque at Ponticum regionem posuit: hæc regio postea Cappadocia dicta est, in qua Urbs Mazica, &c. hæc est terra Magog principalis."—Mesacus, whom Moses calls Mesech, placed the ancient Mesians from mount Adulas as far as the coast of Pontus. This region was afterwards called Cappadocia, in which is the city of Mazica.—This is the principal country of Magog. It is also admitted by Annius, who seems however to forget that Gog was both Prince of Mesech and Tubal, and therefore making the one a nation of Spaniards and the other of Cappadocians, and Spain lying west and not north of Judea, evince the absurdity of the assumption that Tubal in the twelfth year of Nimrod planted a Colony in Spain. Ezekiel xxvii. moreover, prophesying the destruction of Tyre, mentions Mesech and Tubal together; and in chapter xxxviii, describes them as horsemen—"thou and much people with thee, all shall ride upon horses, even a great multitude and a mighty"—who could not in that age have come from Spain through Italy, Dalmatia and round the Euxine into Asia, because it was rendered impossible by the great distance, and the impervious forests by which the earth was then overgrown, and it being contrary to the nature of things to suppose that horses, especially in the multitude mentioned, could so soon after the flood have spread, from where the Ark rested, into Spain or any other European region, and still less likely is it that they could in that period have returned from thence into Asia vastly increased in number.

It may also be observed that Gomer first settled with Togarma not far from Magog and Tubal on the borders of Syria and Cilicia, that he afterwards went further into Asia Minor, and that in process of time, his valiant descendants filled Germany, and long dwelled in France and Britain; possessing the utmost borders of the earth, and accomplishing the meaning of their progenitor's name, which is 'utmost bordering'*: but when they wanted further space for their increasing multitudes, they returned on the nations occupying the countries they had formerly traversed, oppressing their neighbours and afterwards the people more remote, occasioning them, as we are informed by Camden, to be denominated Cimbri, in their language signifying robbers; having been impelled by necessity to despoil their neighbours to whom they were originally as nearly joined as they were subsequently in the regions where they settled: for Cæsar† informs us that the warlike nations of Germany were in the early ages beaten by the Gauls, but in after time, pursued richer but more remote conquests, by which they were drawn into the countries in Asia Minor from which their forefathers had migrated: not however claiming them as an inheritance;

* Melancthon. † Cæsar, Comment.

for it is likely that they knew little of their pedigree. Their having settled in those regions on their return from Europe, affords no reason to conclude that they did not anciently migrate from them, unless it can also be shewn that all the nations which have from remote quarters invaded and conquered Shinaar, and the adjoining countries, did not originally proceed from thence. Samothes who was surnamed Dis, on account of his wisdom, is made by Annius, a brother of Gomer and Tubal: but as Dis is not mentioned by Moses,—and Functius, who is a great Berosian, confesses, Quis hic Samothes fuerit incertum est, who this Samothes was is uncertain; and there being no proof that he was the same Dis, whom Cæsar mentions as the ancestor of the Gauls, and Vignier also confessing, mais on ne sçait pas qui il etoit, no one knows who he was, we are bound to discredit and discard him.

From Javan the fourth son of Japhet were descended the Iones, afterwards called the Greeks, for the Latin and Greek translators, for Javan, write Greece*, Et mittam ex iis qui salvati fuerint ad gentes, in mare, in Italiam et Græciam. And I will send those that escape of them to nations, to the sea, to Italy and to Greece. The Geneva here uses the word Tarshish for Tarsus, a city in Cilicia, though Tarsis is in many places taken for the Sea. The Tigurine and the Geneva use the names Tubal and Javan, and not Italy and Greece, retaining the Hebrew word. From the Iones were descended the Athenians, who however suppose themselves aborigines or men without ancestors, emanating as it were from the soil, from whose exuberant population, colonies settled in Asia Minor, from which were descended the Iones of those parts.

Others† deduce the Athenians from Ion the son of Xuthus, the son of Deucalion, but the antiquity of Javan subverts that supposition, for he long preceded Xuthus, Ion and Deucalion. Pausanias informs us that Xuthus stole from Thessaly his father's treasure and his brothers' portions, and arriving at Athens was graciously received by Erichtheus who gave him his daughter in marriage, the issue of which was two sons, Ion and Achæus, the supposed ancestors of the Athenians; for Plutarch, in his life of Theseus, informs us that Attica was called Ionia and that when he united Megara to Attica, he erected a pillar in the Isthmus which unites Peloponnesus to the other parts of Greece, and had engraved on its eastern part.—Hæc non sunt Peloponesus, ast Ionia. These countries are not Peloponesus, but Ionia, and on its southern side.—These parts are Peloponesus and not Ionia.

Strabo, citing Hecatæus, asserts that the Iones came from Asia into Greece, contrary to the former opinion that the Iones of Greece, sent colonies into Asia Minor. Although Strabo could have known no more about it than he had ascertained from the Greeks, yet the conjecture of Hecatœus seems probable, for though it were unknown to him, it is evident that Asia Minor was peopled before Greece, and that Javan did not proceed from Babylonia into Greece, but first into Asia Minor, leaving his name to one of its maritime provinces, as he also did afterwards to a part of Greece: yet Strabo believed that Ionia took its name from Ion the son of Xuthus, for he had received that impression

* Isaiah. † Thucyd.

from the Greeks. It was likewise the opinion of Pausanius. It is true that in after times the Greeks occupied the tracts of Asia Minor nearest to them, but however they may boast of being the most ancient of people and the father of nations, all approved historians, except their own, deride and refute the pride and vanity of such an assumption.

The dispute of antiquity among profane writers rested between the Scythians and the Egyptians, as is established by the authority of Trogus in his account of the war between Vexoris of Egypt and Tanais of Scythia, which was long anterior to the reign of Ninus and the adoption of the name of Greece. It is also manifest that in the time of Cecrops, the Greeks were a savage race, without law or religion, and St. Augustine* informs us that Cecrops was cotemporary with Moses.

The sixth son of Japhet was Mesech, whom the septuagint call Mosoch, a part of those nations commanded by Gog, the chief prince of Mesech and Tubal. It must however be remembered that between Mesech the son of Aram and Meshech or Mosech, the son of Japhet, there is but a slight difference and both are variously written. Montanus, with the vulgar, writes Mesech, the son of Aram, Mes, the Geneva—Mash, Junius—Mesch. In the 120th Psalm it appears that either Meshech, the son of Japhet, was the parent of those people, or that he gave his name to the province in which David hid himself, or, that it took its name from Mesch, the son of Aram : for David, lamenting his exile among barbarians says, woe† is me that I remain in Mesech and dwell in the tents of Kedar, which is thus rendered by Junius,—Hei mihi quia peregrinor tam diu : habito tanquam Iceuitœ Kedareni. The septuagint has it in this sense,—Woe is me because my habitation, (or abode) is prolonged, who dwell with the inhabitants of Kedar, with which the Latin agrees,—Heu mihi, quia incolatus meus prolongatus est, habitavi cum habitantibus Kedar. The Chaldean has it in these words,—O me miserum quia perigrinatus sum Asianis, habitavi cum tabernaculis Arabum :—O wretch that I am, for I have travelled among the people of Asia, I have dwelt in the tabernacles of the Arabians. Whichever may be considered the best version all make mention of Kedar, which is a province of Arabia Petræa, and the Chaldean puts Asia instead of Mesech as it is in the Hebrew.

If it be taken, as seems probable, for the name of a nation, it is immaterial whether it took its name from Mesh the son of Aram who in 1 Chron. 17, is termed Meshec, or from Meshech or Mesh both bordering on Judea and probably under one prince, for so Ezekiel makes Mesech and Tubal. Those who assume Mesech to be the same as Mosoch, mentioned in the Septuagint, and Muscovian, appear to presume too much on a similarity of names; because David never went so far north, and Muscovia was probably unknown to him ; but he was perhaps in the time of his persecution, frequently on the borders of Kedar, it being a city on the mountains of Saner or Galaad. Yet Arias Montanus makes Mosoch the father of the Muscovians in which Melancthon concurs, placing Mesech in Muscovy, though with better judgment, as situated in Cappadocia and thence proceeding to the north, expounding the portion of the 120th Psalm,—Hei mihi quod exulo in Mesech, to signify, Gentis ejus feritatem insignem esse.

* Aug. de Civitale Dei lib. 18. c. 10. † Psalm cxx. 5.

That the ferocity of that nation was excessive, but it was never proved or experienced, if ever heard of by David, and the same fierceness for which the northern Muscovians were remarkable, may be equally applied to the Arabians, and people of Kedar; for that country took the name of Kedar*, the second son of Ishmael, from whom were descended a race whose ferocity has been scarcely equalled in the world to the present day, if the Arabians, Ishmaelites and Saracens may be considered of the same family as foretold by the Angel to Hagar†. 'And he shall be against every man, and every man's hand against him.'

Now Pliny informs us that Arabia the desert is before Arabia Cochlei on the east, and Cedrœi on the south, both uniting at Nabathœi. It thus appears as before that Mesech, Tubal, Gomer, Togorma and Magog were adjoining Canaan and Israel, as Kedar was to Mesech, and long after the first colony of the issue of Mesech it might have migrated to Cappadocia and thence to Hyrcania, and given names both to Mazega in the one and the mountains of Moschici in the other, and from thence people may have gone northerly to Muscovia.

Teras, the seventh son of Japhet, whom Montanus‡ includes among the sons of Gomer, was the father of the Thracians, as all authors of credibility affirm. Josephus was the first who entertained that opinion; and as the Scriptures do not mention the part of the world which was peopled by Tiras, the different conjectures about it afford no ground for controversy.

The sons of Gomer were Ascanez, Rephath and Togormia.

Josephus says that Ascanez was the progenitor of the race the Greeks call Rhegini, for which however he assigns no reason. Eusebius makes Ascanez the fore-father of the Goths. The Jews in their Targum make him the origin of the Germans. Pliny places Ascania in Phrygia near the rivers Hylas and Cios§. Melancthon is of the same opinion, avering that the Tuiscones were descended from Ascanez; for Tuiscones, he says, is synonymous with that descent, and that the word signifies a preserver of the sacred fire, it having been an ancient superstition to pray at the fire of sacrifices, as afterwards at the tombs of martyrs. Not far from Phrygia was the lake Ascania, known by that appellation [illegible] the Romans. Among the Kings who went to the relief of Troy [illegible]scanius, who is described by Homer‖ as Deo similes, because [illegible] was strong and handsome, as Virgil also describes Æneas, os humerosque Deo similes, in face and body like one of the Gods. Virgil also mentions a river named Ascanius. Illas ducit amor trans Gargara, transque sonantem Ascanium: love leads them over the Gargara Mountains and the roaring Ascanius. Pliny places the city of Brillion on that river, which adjoins Mysia, on the border of the dominion of Troy, and directs us to the lake Ascanez in his description of Prussia, founded by Hannibal at the foot of Olympus, which is in the interior of Bythinia, and the lake is said to lie between Prusia and Nicea which are 25 miles apart; and Junius appears to consider the people of Ascanez to have been the inhabitants of Pontus and Bithinia, and those northern parts of Asia. Stephanus de urbibus makes it a city of Troas built by Ascanius, the

* Genesis xxv. † Genesis xvi. 12. ‡ Montan in Chr.
§ Melancthon in Carion l. i. ‖ Hom. Iliad 2.

son of Eneas, and mentions another place of that name in Mysia. Ptolemy notices a lake of Bithinia named Ascanii, and Strabo describes Ascania as a lake, a river and a town near Cio, which confirms Pliny's assertion of Prusia before mentioned being near Cio, and he names the Islands before Troy, Ascanes. It is doubtful whether these places were named after Ascanez the son of Gomer or Ascanius the son of Eneas, but it is not probable that Ascanius who aided the Trojans could have been named after the son of Eneas, because he was then either not born or very young, and it seems that the countries which rendered that support were farther off than Phrygia or Mysia, being the northern parts of Asia Minor, which Junius thinks Jeremy calls Ascanez by Synecdoche. For the prophet Jeremy informs us of the nation to which the Ascanez belonged, in these words*. Set up a standard in the land, blow the trumpet among the nations against her, call up the Kings of Ararat, Minni and Ascanez against her, &c., meaning against the Babylonians. Most interpreters concur in Ararat being Armenia the greater, so called from being intersected by the Mountains of Ararat, and apply Minni to Armenia minor. Armenia being compounded of Aram and Minni; for Junius and other authors before him state Minni to have been the pristine name, and Aram was the ancient name of Syria, which contained the regions from the Euphrates to the sea coasts of Phenicia and Palestine; and therefore in early times Mesopotamia was but a province of Syria. In the scriptures it is named Padan Aram; then if these two nations were of the Armenians and Ascanez united with them, and all having under Cyrus and Darius aided in despoiling the Babylonian Empire, it is apparent that Askenaz can form no part of Germany or Almain. The Askenaz were of those nations which were either subject or allied to the Medes, and if any of them afterwards came into Phrygia, it is not improbable, for the dispersion of nations in subsequent times was beyond all account. The opinion of Eusebius who makes them Goths, of Josephus who calls them Rhegini, or the Jews, who will have them Almains, not basing their assertions on any part of the scriptures, are unworthy of credit.

The first book of Chronicles mentions Rephath as the second son of Gomer. Beroaldus and Pererius think he wandered far from the rest of his brothers, and therefore no record is preserved of the part of the world in which he settled: but there seems no reason to suppose that he did not settle with the rest of the family, as there was no want of room in those days for the sons and grand-sons of Noah. It may therefore be concluded that the Riphei were descended from Riphath. According to Josephus they were named by the Greeks the Paphlagones, and Melancthon says that Riphei signifies giants. These people were famous for their deeds in the north and in Sarmatea. Sarmatarum Gens Maxima Heneti: the greatest number of the Sarmatians were the Heneti, who spoke the ancient polac.

The love of some of their ancient Kings or leaders induced them to change their name from Rephei to Heneti, a custom which was common in those times. It appears from Homer and Appolonius that they dwelled in Paphlagonia. When these Riphei, afterwards the Heniti, sought new regions they passed along the shores of the Euxine

* Jer. li. 27—51.

and filled the northern parts of Europe which contain Russia, Lithuania and Polonia. From thence, Melancthon says, being desirous of a warmer climate and a more fertile soil, they migrated to Illyria, and adds that the Heneti whom he considers the same as the Veneti, peopled the regions between the Baltic and the Adriatic seas, and the gulph of Venedicus is to this day in Russia. This nation, possessing Lithuania and Polonia, disturbed the colonies of the Boii and Hermondurii. It therefore seems that the Riphei, afterwards the Heneti, came from Riphath, and Arias Montanus is of that opinion, and that they were first seated in Paphlagonia, and in course of time became masters of Sarmatea and the countries lying between the rivers Vistula and Albis. Melancthon says the name signifies wanderers or Nomades.

The sons of Javan were, Elisa, Tharsis, Cethim and Dodanim.

Montanus informs us that the Greeks, called Helenes, are descended from Elisa or Elipha, who Melancthon considers the father of the Æoles in Asia.

The Greeks having generally descended from Javan it is probable that the Æoles and the Elei took their name from Elisa the eldest son*. Ezekiel speaking of Tyre mentions the Isles of Elisa. Hyacenthus et purpusa de insulis Elisæ facta sunt operimentum tuum: blue silk and purple, brought from the Isles of Elisa was thy covering. The Chaldeans for Elisa write Italia, but the vulgar, the Tegurine, the Geneva, and Junius, retain the word Elisa. Sir Walter Raleigh thinks the Isles of Elisa were the Ionian or Grecian Islands. The best purple was afterwards found at Tyre, and previously among the Cyclades on the coast of Getulia.

Tharsis, the second son of Javan, inhabited Cilicia, of which Tharsis is the capital. Montanus erroneously supposes Tharsis in Cilicia to have been Carthage in Africa. The Chaldean paraphrast puts Carthage for Tharsis, but has given no authority for it, and translates Tharsis as Africa.

The nations about Pontus thought no sea equal to their own, and doubted the existence of any other, so that the word Pontus was used for the sea in general. In like manner the Israelites and the Phenicians knew of no other sea, at first, than the Mediterranean, and the people of Tharsis had the greatest ships and were the first navigators in those parts with such vessels. They were therefore called men of the sea, and the word Tharsis was often used for the sea. It is said that the ships of Solomon went every three years to Tharsis, which is therefore merely intended to signify that they went to sea†, and in that sense Tharsis is evidently not intended to apply either to Carthage, Africa, or India, or more properly Ophir, but to the sea itself. The original sense of Tharsis was the chief city in Cilicia, founded by Tharsis the second son of Javan, or by his successor in memory of their progenitor.

Alexander of Macedon at this city threw himself into the river to bathe, which brought on a severe fever, from which his life was endan-

* Ezek. xxvii. 7.

† [This appears unlikely. Scripture, in numerous instances, refers to Tarshish as a *place* of great trade and merchandize, and the Tarshish navy of Solomon is expressly stated to have brought gold, silver, ivory &c. See Kings I. 10th 22. also Jeremiah x. 9th.—Jonah I. 3rd. For the various opinions respecting the locality of Tarshish *vide* 'Murrays Ency of Geography.' Book 1. Part 1.—*Ed.*]

gered. Tharsis was the birth place of St. Paul. The plantation of the first colony, proceeded from Gomer, who with his sons inhabited Asia minor and the adjoining part of Syria. Javan, who ultimately passed into Greece, settled on the coast and established the Iones, gave the Islands between Asia minor and Greece to Elisa, and left Tharsis on the sea coast in Cilicia, from whom the city received its name.

The third son of Javan was Cethim, from whom Beroaldus informs us the people of Italy were descended: but Melancthon with more probability makes Cethim the father of the Macedonians. He says Cethem is in the plural number and signifies percussores in relation to Alexander and the Macedonians Hæc, calamitas ab Esai prædicta est, qui capete vicesimo tertio inquit, venturos esse eversores Tyri ex terra Cittim. This calamity, says Melancthon, was foretold by the prophet Isaiah, who in the 23rd chapter pronounced that the destroyers of Tyre were to come out of Cittim. As the children of Israel conceived all men to be Islanders who came to them by sea and separate from their continent, so Beroaldus thinks Cittim might have been taken for Italy: yet we must first take the performance of the former prophecy which was verified by the destruction of the Tyrians by Alexander, who, after a seige of seven months, entered Tyre, slew 7000 of its principal inhabitants, strangled 2000 and carried 13000 of the people into captivity. It appears in the first book of Meccabees that Macedon was taken for Cithim, in these words. "After that, Alexander the Macedonian, the son of Philip, went forth of the land of Cethim and slew Darius King of the Persians and Medes."—Josephus places Cethim in the Island of Cyprus, in which he says there remains the city Cetium, the country of Zeno* the Philosopher, which city Pontus asserts was standing in the time of St. Jerome. It is probable that in ancient times all the Islands were by the Hebrews called Cethim, and that as Tharsis was the next port to Cyprus, Cethim settled near his brother Tharsis, and when that Island became too small for its increased population and the other coasts, both of Asia and Greece being inhabited by his father and brothers, he sent his superfluous multitude over the Ægean sea to inhabit Macedonia.

It is believed by historians that Dodanim, the fourth and youngest son of Javan, settled at Rhodes, as near as he could to Cethim, Tharsis and Elisa; for Dodanim and Rhodanim are used indifferently by many translators, in consequence of the similitude between the Hebrew d ד and r ר. The city of Dodona is also found in Epirus in the province of Molossia. Like the descendants of Cethim, the posterity of Dodanim went further off, and finding Peloponnesus in the possession of Elisa they passed further west and settled in Epirus. Although the city of Dodona was not then built, his posterity might, in honour of their first parent, have given it his name, as was the common practice in the early ages; for mountains, rivers, provinces and cities were named after Noah's children and grand children, not in all places by themselves, but many years afterwards by their successors, their families being desirous of thus preserving the memory of their progenitor. As great kingdoms often received new names from their conquerors, and the greatest cities were burnt and destroy-

* Laertus.

ed, those who hoped to perpetuate their memories, gave their names, or those of their ancestors, to mountains, rivers, and such things as were in their judgment the least liable to change.

Thus Javan settled himself and his children on the frontier of Asia minor towards the sea coast, and afterwards in Greece, its Islands and neighbouring provinces, as Japhet had done in Asia minor with Javans brethren Gomer, Magog, Madai, Tubal, Mesech and their adherents.

(*To be continued.*)

SOME ACCOUNT OF THE ORIGIN AND PROGRESS OF THE DUTCH FACTORY AT KALCAPOOR, UNTIL ITS CESSION TO THE ENGLISH IN 1825.

By George Herklotts, Esq.

In the village C[illegible]capoor, in the district of Moorshedabad, the Dutch East India Company established their Factory called Cassimbazar, and in the year 1739 erected, besides the necessary dwellings for their servants and godowns for the silk trade, a princely building for the residence of the chief at the expence of 150000 Rupees, the whole being enclosed by a brick wall, and a place for a Burying ground annexed, which is yet in existence and under the care of the local authorities.

It appears from the Records that the first establishment at Cassimbazar commenced in 1722. In what it consisted at that time cannot be traced. It afterwards consisted in,

A chief of the rank of Senior Merchant,
A second of do. of Merchant,
Two Junior Merchants,
A Factor and two Assistants,
A Surgeon,
A military guard of a Sergeant or Corporal with
A few European Soldiers.

The Junior Merchants were besides ordinary Commissioners; also first and second residents of the Mint at Kurreemabad, with an Assay Master. The chief took cognizance of all complaints amongst Europeans and Natives, and an appeal from his decision lay, in European cases, to the Court of Justice at Chinsurah, and in cases of Natives to the Director or Governor at Chinsurah. The chief, as well as the second, had notarial authority. The number of functionaries and inhabitants has not been ascertained, but in one notarial deed passed on the 25th September, 1775, before the then second, Mr. Pieter Brueys, sworn notary, appear the following as parties :—

Johannes Mattias Ross, Senior Merchant and chief.
Jacob Nicolas De Meyer, Junior do. and Treasurer.
Abraham Martinus Brahé do. do. ordy. Commissioner.
Rudgert Reinier Keyser do. do. and Warehouse keeper.
Lodeweyk Real De Bas, Junior Merchant and ordinary Commissioner.
Nicolas Daniel Ley, Assistant.
Matheus Meyer, do.

Herman Jeths, Surgeon.
Jan Gantvoordt, ex Surgeon and
Cornelis Lurkus and } as witnesses.
Jan Godfreed Hopman }

Besides these civil functionaries there were other European and Armenian residents, private inhabitants, as Messrs. Cumme, Ashenberg and others.

Gregorius Herklots, first resident of the mint at Kurreemabad.
David De la Roche second do. do.
John Hendrik Hagadannus Assay master.

The private landed property out of Kalcapore Factory, as far as is known, consisted in a House and Garden called the "large garden," situated north of the river, east the public road, south a lane, and west on the garden of Mr. De la Roche, called the smaller garden; the former the property of Mr. Anthony Bogaards, who sold to Mr. Nicolas de Meyer for Rs. 3300: The Jheel called Bissempoor Rosseek Kackera, situated W. S. W. of the Dutch Factory, connected by a bridge with the village Berhampore, flowing towards the River Ganges. The Jheel was formerly the property of one Rammanent, from whom Mr. Ross purchased it for Rs. 1001—who afterwards sold it to the Dutch Company for the same price.

The object of the Dutch Company in establishing a factory at Cassimbazar and buildings at Calcapoor was to procure manufactured silk goods for the European and Indian market, according to musters and samples sent out from Europe. These musters the writer of this has seen himself when they were sold at auction at Chinsurah after the settlements were restored to the Dutch, and more beautiful patterns and stuff he never in his life has seen. The Dutch introduced, also, the silk winding after the Italian mode, and large quantities of raw silk were then sent to the Europe market.

As such a large establishment was kept for this single object it may well be conceived that the trade in manufactured silk goods, and raw silk must have been very great; merchandize, such as Spices, Pepper, Japan Copper, Broad Cloth, Velvet, &c. &c. were sent there and disposed of. Silver in Bars was sent to the King's mint at Kurreemabad to be coined into Rupees under the superintendence of Dutch residents on the spot.

The names of the chiefs at Calcapore which could be ascertained from existing records go not beyond the year 1772, and are—

Mr. Johannes Mattias Ross,

Mr. Gregorius Herklots, after having been mint resident at Cassimbazar in 1772, chief of Patna till 1780, acting Governor of Chinsurah till 1786; returned as chief of Calcapore, and there died in 1787.

Mr. Cornelis van Citters, who had been chief at Suratt succeeded Mr. Herklots, and on his promotion to the chief Directorship at Chinsurah in 1792 the establishment of Calcapore was broken up, and Mr. Hans Jacob Holst was sent there as representative of the Dutch Government, and to enjoy the revenues of the place and Jheel as his emoluments.

After the restoration of the Dutch settlements in 1817, Mr. B. C. D. Bournan was sent there as post holder on the part of the Dutch on a salary. The station was finally ceded to the English in 1825.

ANNALS OF THE MISSION CHURCH, CALCUTTA.

The Rev. Mr. Kiernander, the founder of this Church was a Swede, in the service of the C. K. S. He arrived in Calcutta in 1758, having left Cuddalore in consequence of that place being taken by the French. Lord Clive held him in high esteem. The first Church was erected in Calcutta in 1715; it was about 50 yards distant from the Old Fort, and was built at the expence of the Calcutta merchants and seamen. In the early charters granted to the E. I. C. was a clause, requiring them to maintain a chaplain and schoolmaster wherever a European regiment was stationed, and also that *the chaplains of the Company should qualify themselves to afford Christian instruction to the Hindu and Portuguese servants of the Company, in their native languages.* The Church was levelled to the ground by an earthquake in 1737; it was rebuilt soon after, but was demolished by Surajah Dowlah in 1756. In 1758, Mr Kiernander opened a school in Calcutta called the Mission School, the next year 175 children were in attendance, composed of Bengalis, Portuguese and English; he preached in Portuguese, but preferred educating children, as he entertained better hopes of their yet tender minds than from those who had grown old in wickedness and ignorance. As Mr. K. was ignorant of Bengali he instructed the adults in Portuguese, which at that time in Calcutta was become almost a general language. The animosity excited among the natives against the British, together with

the excitement prevailing among the English in consequence of war, proved a barrier at this period to mission operations. In 1767 Mr. K. wrote to the C. K. S. "that being obliged to give up for the use of the E. I. C. (it had been given to him rent free for 8 years) the house which served him as a school and Portuguese Church, he resolved to build a church at his own expense, and on his own ground." He had already expended £250 and he calculated the whole expense would amount to £2500. In the congregation over which Mr. K. presided, he was aided by two persons who had been Romish priests and conformed to the Anglican Church. In 1771, the year of the great famine in Bengal, when 1,400,000 persons perished from starvation, and the streets and roads in Calcutta were daily strewed with dead bodies, the Mission Church was opened and dedicated to God under the care of the C. K. S., the cost amounted to 16,000 sicca rupees, the expense was defrayed by Mr. K. out of his private resources, except some benefactions amounting to 1800 rupees. Hitherto Mr. K. had preached in his own dwelling house; but divine service began now to be performed in the Church twice every Sunday morning in Portuguese and English, and once in the afternoon in Portuguese, besides prayers on Wednesdays and Fridays with catechising. It was named Beth Tephillah. The communicants in the English congregation amounted to 85 ; in the Portuguese to 69. Mr. K. never allowed the natives to work at the Church on Sunday, and was much grieved at the opposite course of conduct being pursued by Europeans in Calcutta. In 1773 Mr. K.'s wife died, her personal property and jewels were at her request sold, with the produce amounting to 6,000 rupees Mr. K. commenced building a school room which was much wanted for the mission ; it was built at the east side of the Church where what are called the Old Church Rooms now stand and was capable of containing 250 children. It was opened in 1774. In 1775 a missionary from Halle, Mr. Diemer, joined the mission. In 1783 the Rev. W. Hulse, chaplain to the Commander in chief, gave the mission 500 Sa. rupees. Mr. K. gave 1000, and his son 3000.

In 1786 the English communicants amounted to 147, the Portuguese to 119. In later years Mr. K.'s son performed the English services in the Mission Church.. The Rev. D. Brown arrived at Calcutta in 1786 as chaplain to the Kidderpoor Orphan establishment; his arrival strengthened the cause of true religion in Calcutta ; he found congenial spirits in Messrs. Grant, Chambers, and Ellerton.—Mr K., in consequence of the failure in business of a person for whom he had become surety, was involved in pecuniary embarassments and the seal of the Sheriff of Calcutta was in 1787 affixed to the gates of Beth Tephillah, which, as part of his property, became subject to the law. Mr. Grant came forward and redeemed the Church for 10,000 rupees and Mr. Brown engaged to officiate in it, as he did for 23 years, without fee or reward. Mr. B. felt a deep interest in missions ; he established in 1787 an Orphan School for Hindu children in which English and Bengali were to be taught, while Mr. Ellerton engaged in translating the New Testament into Bengali. His opinion was "The low natives seem first to need improvement of intellect to enlarge the number of their ideas, before they have even a capacity to be instructed in Christianity, hence schools are the present favourite pursuit in my mind." He found great difficulty in procuring proper masters. After officiating at the Mission Church for

2 L

7 months, the managers of the Orphan Society insisted on his quitting the Church, or on his immediately dissolving his engagement with them. He preferred the latter alternative, though attended with pecuniary loss. In after years he saw much fruit from his labours ; for while mere heathen morality has been ocasionally preached in the other city churches, the Gospel has always given a distinct note in the Mission Church. In 1791 Mr. B. stated, in a letter to a friend, he would retire from the Mission Church on the arrival of a missionary. The C. K. S. had erected a building with suitable accommodations for two missionaries. In 1793 the increased attendance at the Church rendered its enlargement necessary. Previous to this time it was a clumsy, unplastered brick edifice, choked up with old houses ; from the red colour of its walls it was called by the natives the *lal grigea* ; it had a brick pulpit against a wall, and its aisle was floored with rough, uncovered tiling ; it could accommodate about 200 persons ; a few rude benches and pews of unpainted plank formed the general seats. On the 29th Dec. 1793, the Church was opened after its enlargement, the sacrament was administered on the occasion by Mr. Kiernander. In 1796 the C. K. S., having repeatedly failed in their attempts to supply the Church with suitable missionaries, abandoned any further exertion. In 1802 a Society in connection with the Mission Church, composed of about 20 persons, who had experienced conversion and wished to enjoy Christian conversation and fellowship, was organized; it met the first Monday evening in the month at the house of a Mr. O'Beck, a pious Christian ; Mr. Brown was the leader of this pious band. It contributed very much to fan the flame of piety. In 1802, Mr. B. established the Evangelical Fund "in order that the Mission Church might always have the means of providing itself with a minister." 10, 000 rupees were raised in 18 months. The Court of directors in 1808 appointed a Chaplain to the Mission Church ; the Evangelical Fund has been therefore chiefly expended in building a Parsonage, in purchasing ground adjacent to the Church, to render approach to it more convenient, and in repairing and enlarging the Church. A cloud of embarrassment during several years hung over the Church, which was removed in 1805 by Government, who paid 12064 rupees on its account, and gave a monthly allowance of 233 rupees for its support. The property in the Evangelical Fund was valued at 40,000 rupees. Mr. B. always attended to mission labours ; his soul was in the work, but the Europeans in Calcutta made great opposition. Dr. Buchanan formed the worst opinion of Calcutta hearers of the Gospel ; he said "nothing will do them good but an earthquake, a massacre, or fire from heaven." In 1807 the Evangelical Fund amounted to upwards of £5000. In 1808 Mr. Thomason was appointed its minister. Its subsequent history is sufficiently known to our readers.

Rectification of the Circle.

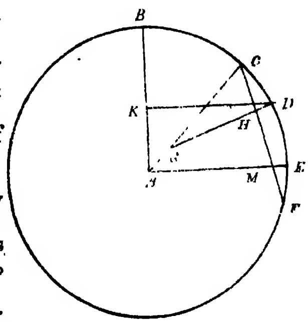
To the Editor of the 'India Review.'

Sir,

I read with much satisfaction in your last published and your December Number the paper of your correspondent S. K. C. E. on the rectification of the circle*. The cause of my satisfaction is that your correspondent so properly gives his method only as an approximation, instead of attempting, as squarers of the circle generally do, to shew that it is geometrically correct. I regard it as a very neat performance and highly creditable to your correspondent whoever he be. My object in writing to you now is two-fold, *first*, to request your correspondent to state the process by which he was led to his conclusion, (the analytical process in such cases ought always to be fully given); *and second*, to forward to you the following verification by analytical geometry, which I think vastly preferable to the trigonometrical method that your correspondent adopts and recommends. I have carried the square root of 3 to 26 decimal places, and this gives the result correct to 7 decimal places. The eighth decimal is 2, whereas it ought to be 5, and I do not think that carrying the decimals further would make all this difference. I therefore regard the method as correct only to this extent. But the geometrical construction is so simple and so neat that I regard this as a very satisfactory approximation. Allow me to say that in a country like this, where there must be so many well educated men with much spare time on their hands, I esteem it a great boon that you permit your pages to be open to such communications; and, although they must be somewhat uninteresting to the majority of your readers they are particularly interesting to those who take pleasure in mathematical pursuits.

I am, Sir, yours respectfully,

ΟΥΚ ΑΓΕΩΜΕΤΡΗΤΟΣ.



Let AE, AB be rectangular axes of co-ordinates, then the Equation of AC which makes equal angles with the axes is $y = x$; and making Radius $= 1$ we have for the co-ordinates of the point C, $x = \frac{1}{\sqrt{2}}$, $y = \frac{1}{\sqrt{2}}$ and for the co-ordinates of G, $x = \frac{1}{4\sqrt{2}}$; $y = \frac{1}{4\sqrt{2}}$. Let us now find the equation of the line C F. It is evident that the angle CME is 105° we have therefore $y = x.\tan 105° + b$.

$$= -x.\tan 75° + b.$$

* [Since our attention has been called again to this subject, we take occasion to express our regret for the errata that occurred in the article of S. K. C. E. in our last No. They were not, however, such as to make the article unintelligible to a mathematician, and no other would be able to understand the article at all events.—*Ed.*]

But—$\tan 75° = \frac{1+\sqrt{3}}{1-\sqrt{3}} \therefore y = \frac{1+\sqrt{3}}{1-\sqrt{3}} x + b$

But since C, $\left\{\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right\}$ is a point in the line C F we have

$$\frac{1}{\sqrt{2}} = \frac{1+\sqrt{3}}{1-\sqrt{3}} \cdot \frac{1}{\sqrt{2}} + b.$$

$$\therefore \frac{1-\sqrt{3}}{\sqrt{2}(1-\sqrt{3})} - \frac{1+\sqrt{3}}{\sqrt{2}(1-\sqrt{3})} = b = \frac{-2\sqrt{3}}{\sqrt{2}(1-\sqrt{3})} = -\frac{\sqrt{6}}{1-\sqrt{3}}$$

Hence the Equation of CF is $y = \frac{1+\sqrt{3}}{1-\sqrt{3}} x - \frac{\sqrt{6}}{1-\sqrt{3}}$

Our next object is to find the co-ordinates of H. For this purpose we have

$$\left\{x - \frac{1}{\sqrt{2}}\right\}^2 + \left\{y - \frac{1}{\sqrt{2}}\right\}^2 = CH^2$$

That is $\left\{x - \frac{1}{\sqrt{2}}\right\}^2 + \left\{\frac{1+\sqrt{3}}{1-\sqrt{3}} x - \frac{\sqrt{6}}{1-\sqrt{3}} - \frac{1}{\sqrt{2}}\right\}^2 = \frac{1}{9}$

or $\left\{x - \frac{1}{\sqrt{2}}\right\}^2 + \left\{\frac{(1+\sqrt{3})x\sqrt{2} - (1+\sqrt{3})}{\sqrt{2}(1-\sqrt{3})}\right\}^2 = \frac{1}{9}$

$$x^2 - x\sqrt{2} + \tfrac{1}{2} + \frac{(1+\sqrt{3})^2(2x^2 - 2x\sqrt{2} + 1)}{2(1-\sqrt{3})^2} = \frac{1}{9}$$

$$x^2 - x\sqrt{2} + \tfrac{1}{2} + \frac{(4+2\sqrt{3})(2x^2 - 2x\sqrt{2} + 1)}{2(4-2\sqrt{3})} = \frac{1}{9}.$$

$$(4-2\sqrt{3})(x^2 - x\sqrt{2} + \tfrac{1}{2}) + (2+\sqrt{3})(2x^2 - 2x\sqrt{2} + 1) = \frac{4-2\sqrt{3}}{9}$$

$$8x^2 - 8x\sqrt{2} + 4 = \frac{4-2\sqrt{3}}{9}$$

$$x^2 - x\sqrt{2} + \tfrac{1}{2} = \frac{4-2\sqrt{3}}{72}$$

$$x - \frac{1}{\sqrt{2}} = \pm \frac{1-\sqrt{3}}{6\sqrt{2}}$$

$$x = \frac{1}{\sqrt{2}} \pm \frac{1-\sqrt{3}}{6\sqrt{2}}$$

As the quantity under the double sign is itself negative, and as $x > \frac{1}{\sqrt{2}}$, the under sign must be taken $\therefore x = \frac{1}{\sqrt{2}} - \frac{1-\sqrt{3}}{6\sqrt{2}} = \frac{5+\sqrt{3}}{6\sqrt{2}}$

In order to find y we must substitute this value of x in the equation of C F as found above ;

then $y = \frac{1+\sqrt{3}}{1-\sqrt{3}} \cdot \frac{5+\sqrt{3}}{6\sqrt{2}} - \frac{\sqrt{6}}{1-\sqrt{3}} = \frac{8+6\sqrt{3}}{6\sqrt{2}(1-\sqrt{3})} - \frac{12\sqrt{3}}{6\sqrt{2}(1-\sqrt{3})}$

$$=\frac{8-6\sqrt{3}}{6\sqrt{2}(1-\sqrt{3})}=\frac{5-\sqrt{3}}{6\sqrt{2}}$$

The co-ordinates of the point H are therefore $x=\frac{5+\sqrt{3}}{6\sqrt{2}}$; $y=\frac{5-\sqrt{3}}{6\sqrt{2}}$.

The next thing is to find the equation of the line G H passing through the points G and H. For this purpose we have

$$y-\frac{1}{4\sqrt{2}}=\frac{\frac{1}{4\sqrt{2}}-\frac{5-\sqrt{3}}{6\sqrt{2}}}{\frac{1}{4\sqrt{2}}-\frac{5+\sqrt{3}}{6\sqrt{2}}}\left\{x-\frac{1}{4\sqrt{2}}\right\}$$

$$=\frac{6-(20-4\sqrt{3})}{6-(20-4\sqrt{3})}\left\{x-\frac{1}{4\sqrt{2}}\right\}=\frac{14-4\sqrt{3}}{14+4\sqrt{3}}\left\{x-\frac{1}{4\sqrt{2}}\right\}$$

$$y=\frac{14-4\sqrt{3}}{14+4\sqrt{3}}x+\frac{1}{4\sqrt{2}}\left\{1-\frac{14-4\sqrt{3}}{14+4\sqrt{3}}\right\}$$

$$=\frac{14-4\sqrt{3}}{14+4\sqrt{3}}x+\frac{8\sqrt{3}}{4\sqrt{2}(14+4\sqrt{3})}=\frac{14-4\sqrt{3}}{14+4\sqrt{3}}x+\frac{\sqrt{6}}{14+4\sqrt{3}}$$

We are now able to find the point of intersection of G H with the circle; for this purpose we have to combine the equation just found with the equation of the circle $x^2+y^2=1$, From the Equation of G H we get

$$y^2=\frac{(244-112\sqrt{3})x^2+(28-8\sqrt{3})x\sqrt{6}+6}{244+112\sqrt{3}}$$

$$=\frac{(122-56\sqrt{3})x^2+(14-4\sqrt{3})x\sqrt{6}+3}{122+56\sqrt{3}}$$

Hence $x^2+y^2=\frac{244x^2+(14-4\sqrt{3})x\sqrt{6}+3}{122+56\sqrt{3}}=1$

$$244x^2+(14-4\sqrt{3})x\sqrt{6}=119+56\sqrt{3}$$

$$x^2+\frac{(14-4\sqrt{3})\sqrt{6}}{244}x=\frac{119+56\sqrt{3}}{244}$$

Completing the Square,

$$x^2+\frac{(14-4\sqrt{3})\sqrt{6}}{244}x+\frac{366-168\sqrt{3}}{59536}=\frac{29402+13496\sqrt{3}}{59536}$$

$$x+\frac{(7-2\sqrt{3})\sqrt{6}}{244}=\pm\frac{\sqrt{29402+13496\sqrt{3}}}{244}$$

$x=.9060367043238843$

$y=\sqrt{1-x^2}=.4231991143869812$

$1-y=.5768008856130187$

$1-y:x=2:3.14159262$

Which is correct only to the seventh decimal.

The Earl of Rosse's Great Telescope.

To the Editor of the 'India Review.'

Sir,

In the memorabilia of astronomical affairs, for the past year, or at least of events connected with the science, I think we may regard the particulars narrated in the accompanying paper in every way worthy of a place in your Journal. It relates to the casting of the great speculum for Lord Rosse's Telescope;—an instrument on a scale, and with powers so gigantic, as to hold out the strongest hopes that our discoveries in siderial astronomy will astonishingly extend our knowledge of the Heavens.

Of the arrangements for this interesting operation the enclosed Diagram will convey all the idea which it is necessary to possess. It is constructed on the *pecuniary data* which served to illustrate Sir James South's account, that from which the following abstract is taken: for the Crown, Half crown, Shilling and minor coins, out of which Sir James furnishes his illustration I have substituted a few lines, on paper;—not the first or the only instance in which they have been made to represent similar things on a much more extended scale.

Yours,
SIDUS.

Casting of the speculum for the Earl of Rosse's Great Telescope.

The diagram represents a horizontal section of the Foundry.

A, B and C represent the crucibles in their furnaces.

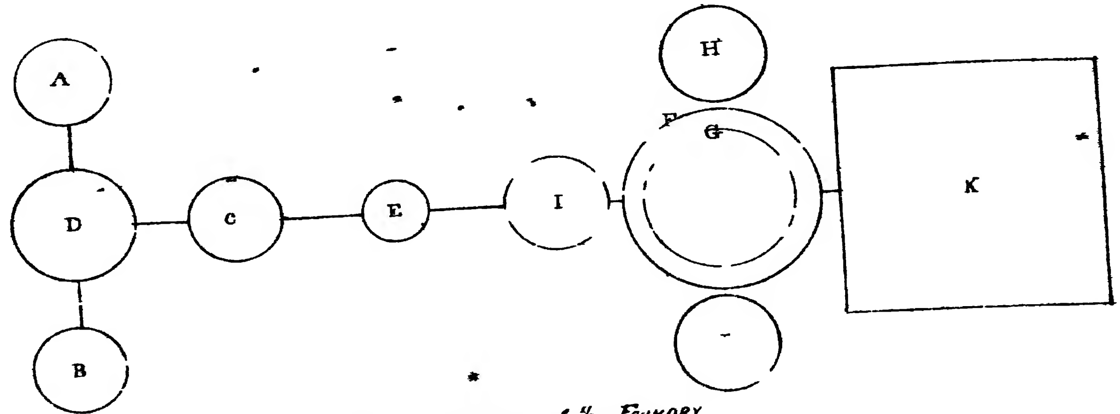
D. The Chimney.
E. The Crane.
F. The bottom of the mould 6 ft. 8 In. diameter.
G. The wood pattern of the mould 6 ft. diameter.
H. I. J. The Iron pouring baskets.
K. The floor of the annealing room.

The Crucibles were of cast Iron, 24 Inches interior diameter, and 30 Inches deep, each weighing about half a ton. They were kept *in situ* above the bars of the furnaces by cast iron supports and subjacent brickwork.

The Furnaces about 5½ feet square, were brick; their fuel apertures were 4 feet diameter; their height above the gratings, 8 feet; their ash pits, 2 feet; and their several flues passed into the chimney, which was 5½ feet square at bottom and in height was many yards.

The Iron pouring Baskets were supported on wooden frames, and were supplied with pivots; one pivot of each basket having had welded on it at a convenient angle an iron lever about 3 feet long, by which the basket with its contents was turned on the pivots without difficulty.

The Bottom of the mould 6 feet 8 Inches in diameter was formed of iron hoops, packed as closely as possible side by side, their



Hor. ual Secton of the FOUNDRY

For the Casting of the Earl of Rosses Speculum

edges up, and turned in the Lathe till the upper surface had imparted to it a convexity necessary to produce the wished for concavity in the surface of the speculum when cast.

THE WOODEN PATTERN of the mould was full 6 feet in diameter and about $5\frac{1}{2}$ inches thick, the bottom of the mould having been included in a quadrangular wood frame, and having sand rammed between. it and the wooden pattern the latter was removed by the crane: the mould thus made being perfectly horizontal was ready to receive the melted mass.

THE METALS of which the speculum is composed are copper and tin, 126 parts of the former to $57\frac{1}{2}$ of the latter: had it been 58 of Tin, the proportions would have been the atomic standard.

The copper employed was fragments of copper sheathing and about 3 Tons of it were used; the Tin was grain-tin. The price of the Copper was about £100 a Ton; that of the Tin I do not know.

At 2 o'clock in the morning of Wednesday the 13th of April the furnaces were lighted, and in about 10 hours the Crucibles were in a state fit for receiving their respective charges.

The Metal, which had been previously fused and broken up, was distributed equally amongst the Crucibles, so that any accidental difference in it was probably destroyed.

By 9 in the evening the furnaces were opened and the flames of nearly homogeneous yellow light which issued from them were splendid. The countenances of the by-standers looked like those of ghosts whilst the scarlet coats of the officers present seemed a dirty yellow.

Tackle from the Crane was now fastened to one of the Crucibles at the extremity of the chimney line, and when raised above its furnace, the revolution of the crane on its centre deposited it as quietly as possible in its corresponding iron basket; it did the same for the second crucible, and also for the third.

By turning the iron baskets on their pivots the contents of the crucibles were simultaneously poured into the mould and some minutes elapsed before the undulatory motion of the fluid metal ceased.

In about 20 minutes the quadrangular wooden frame and sand were removed; an iron ring connected with a bar passing through the oven at the back aperture was clamped round the red hot speculum, the tackle of a capstan was hooked to the bar and the speculum was hauled from the bottom of the mould over an iron railway into the annealing oven. The oven, whose interior had been kept at a dull red heat for some days, was now charged with charcoal, the arches below with turf, and every opening of the oven built up and plastered over, and it is supposed that two months will elapse before the speculum is cool enough to be removed with safety *.

Not an accident or any thing untoward happened during the process; and in 40 minutes from the time of the first crucible being moved the speculum was safely in the oven.

The metal is 6 feet diameter! it is $5\frac{1}{2}$ inches thick at the edges and 5 inches at the centre; its weight is about 3 tons.

By grinding and polishing, its thickness will probably be reduced 1-10th or $\frac{1}{8}$ of an inch—it will be formed into a Telescope of 50 feet

* The speculum was not removed until it had been in the oven nearly 16 weeks.

focal length, and will, there is every reason to hope, be actually in use this year.

The speculum will have a reflecting surface of 4,071 square inches; whilst that of the Telescope made by the immortal Herschell, under the auspices of King George the 3rd, had but 1,811.

J. SOUTH.

Observatory,
Kensington.

P. S. The Foundry is not many feet from Birr Castle, the residence in Ireland of the Earl of Rosse; and with the exception of the crucibles which were made by Messrs. Dewer of Old Street, St. Lukes, all the apparatus employed on this interesting occasion, (the steam engine itself included) was made in workshops adjoining the castle under the Earl's immediate directions, by workmen trained and instructed by himself.

Specimens of Chinese Art.

To the Editor of the 'India Review.'

Sir,

As the artists of your miscellany appear, to the extent necessary, to be as much at the service of your Correspondents as your Printers, I am induced to place at your disposal, for a few days, the accompanying Chinese relics, which, if described and pictorially illustrated, may interest some of your readers, and otherwise contribute, in however trifling a degree, to that knowledge of the Chinese, as a scientific people, which the possession of so many of their works of art, taken as booty during the late war, and before unknown to Europeans, will, no doubt, greatly increase.

The Articles (*loot* of course) are these :—

1. One of the four singular solid porcelain heads which embellished the angles of the outer cornice work of the celebrated great Porcelain Tower of Nankin. The one forwarded is the most perfect of the four heads, all of which, I regret to state, received much injury in the hurried and awkward manner in which, consequent to the want of a proper implement, they were broken off.

2. A figure of the Philosopher *Confucius*, seated on a stag, which holds in its mouth the branch of a tree, the leaves of which spread over its body. The head of Confucius is of most remarkable conformation, and in the hands of a Gall or Spurzheim might elicit some interesting conjecture as to those qualities which drew forth the undying veneration of the people. It is, indeed, difficult to conceive that the artist could have formed so singular a cranium without some designed reference to those qualities, fancied or real, by which the philosopher was distinguished. Both figures are of brass, bronzed, hollow and cleanly cast. The Philosopher is moveable, and from certain odour which are perceptible to a delicate nose, it is highly probable that the body of the Stag was used for some such purpose as a pastile burner.

3. A gilded idol, one of many, taken from the Porcelain Tower. Whether this be a deity, saint, or devil, I know not.

4. A Goglet of the same metal as the figure of Confucius. The handle is formed of some nondescript lizard or dragon.

5. An ebony mace, set with three engraved badges of *Jete* or *Jate* (?) stone*, and inlaid with two long inscriptions, which, if you can command the services of a translator, will possibly afford interesting information. The mace was taken from a Mandarin, and, I was told, forms the office badge of that class of officers. The whole of the letters are of silver, inlaid as in the *Buhl* work of England.

6. A small iron or steel shield, 6 inches in diameter, offensive and defensive. A spear head projects from the centre, and a pair of twisted horns, tipped with steel, form the handle: altogether a very formidable looking weapon. I am by no means assured, however, of *this* relic being Chinese: it bears more resemblance to the weapons of the Nepalese.

7 & 8. A pair of somewhat clumsy swords. The blade of no. 8 is uncovered on one side. The sheath is of wood.

9. An arrow with a hollow perforated head for carrying ignited tow.

10. A broad headed arrow.

11 & 12. 6 varieties of arrow heads.

With regard to the porcelain head (or rather, indeed, the four heads), I must, in justice to myself, be allowed to state that they were taken (*stolen*, if you prefer the *honest* truth) under the excitement of that spirit of destruction and *lex talionis* principle which so commonly blinds the judgment—blunts the better feelings of our nature, and poisons our sympathies into an unjustifiable enmity against the unoffending goods and chattels of our conquered enemies. In this spirit I am sorry to state that the Tower of Nankin suffered very great injury. Of the porcelain tiles with which it is lined, I send two small pieces for your inspection†.

The return of the articles (of which nos 1, 3, and 5 only are my own) when done with, to the friend through whom I send them, will oblige—

Your's obediently,
W. R. V.

Mastic Flooring.

To the Editor of the India Review.

Dear Sir,

Your remark, at the foot of the estimate which I made out for your last April number, of the cost of laying floors and roofs in Asphaltum from the data furnished by Capt. Goodwyn, has induced me to go through the whole calculation again.

You say that it has been stated to you that my estimate is too high "unless the substratum be of the most expensive kind." The kind of

* An imitation, probably, of such a stone, but evidently a composition, cast in a mould.—*Ed.*

† The tiles are about 3 inches by 2½ broad, and nearly ¼ of an inch thick. They are perforated on the under side by holes in an oblique direction at the corners, for the purpose, no doubt, of being fastened to the wall by means of wire.—*Ed.*

substratum is described in my estimate as the *usual concrete*, and is down at a price two roopees lower than usual:—but I will shew you, lower down, that even if the whole cost of the concrete or substratum be deducted, the expense of the Asphaltum terrace must be more than I had made it out in the above mentioned estimate: in short, that the Asphaltum alone costs more.

Finding that I could not reduce my figure, I went through Capt. G.'s calculations, and I found that he had made a mistake. He says "the mastic is in blocks of 1 Cwt. each 18×6" ×4"" and "30 [of them] will cover a space of 400 sup. ft. $\frac{3}{8}$ thick for flooring." Now this is a mistake, unless the stuff increase its bulk 66¼ per cent. in the process: if it do not grow under the operation, that quantity will only cover 240 sup. ft.

My estimate ought, consequently, to have stood thus.

1½ Tons Mastic	Co.'s Rs.	97	8	0
Freight to Calcutta...	"	15	0	0
Commission charges, &c.	"	5	8	0
Fuel and Labour	"	7	3	3
Cost of the 1½ tons Mastic, laid down, but as this will cover 240 sup. ft. the cost for 100 ft. will be, for		125	3	3
Mastic laid down...	Co.'s Rs.	52	2	8
Concrete...	"	12	0	0
Hydraulic Mortar	"	4	0	0
		68	2	8
Without the Hydraulic Mortar	Co.'s Rs.	64	2	8
The mere Mastic alone	Co.'s Rs.	52	2	8
The amount of my former estimate	Co.'s Rs.	48	8	0

N. B. All these estimates are made out on the supposition that the Mastic does not increase in bulk during the operation of laying it down.

Your most obedient, &c.
S. MORNAY, *Civil Engineer.*

REVIEW.

The Exiles of Lucerna, or the sufferings of the Waldenses during the persecution of 1686. *Edinburgh*, 1841.

Ella, a tale of the Waldensian Martyrs: and other Poems by T. W. Smyth. Calcutta, 1848.

It is not *very* probable that we shall ever write or publish a poem; and yet in these days of strange events and occurrences he were a bold man who should pronounce any thing to be too unlikely to be realized. If, then, the " fine frenzy" should come upon us, and should come, as it is likely to come if it come at all, not with the resistless impetuosity of

the tornado, but with the soft *afflatus* of the gentle zephyr, so as to leave us not wholly destitute of power to choose the details of subject, manner, and so forth, we know no theme that we should prefer before the sufferings and exploits of the Waldenses. Their history is poetry ready made. With Arnaud for his hero, and the valleys of Lucerne and Perosa for his scene, even the man who asked what Racine's tragedy was meant to demonstrate could scarcely write prose.

But the subject is grave enough to demand a graver strain. We say, then, that we know not a nobler subject for a historical poem than the sufferings and achievements of the Waldensian martyrs and heroes. If we consider the strange vicissitudes of fortune to which they were exposed, we shall see that the poet would experience no lack of incident with which to furnish out a regularly constructed epic. Confining himself to but one chapter in their history, he might picture the happy peasants cultivating the loveliest valleys that are warmed by the rays of the sun and watered by the streamlets of the mountain, and wending their way on the Sabbath morning to the spots where their village churches lifted their humble spires over trellised vineyards on the sunny hillside or waving cornfields in the bottoms of the glens. He might picture the gathering of the storm of persecution and the sudden outbreak of thunder and tempest on their peaceful smiling valleys. He might sketch the outline of tortures and torments till the hearts of the sternest of his readers were appalled, and leave a residue in comparison of which those that it were possible to delineate should be but as sport. He might tell of the young and the brave constrained to look on with fettered limbs while their mothers and wives and sisters and infant sons and daughters were massacred ; while fire and faggot and the headsman's axe were the mildest and gentlest weapons of persecuting malignity ; he might tell of the *thousands* of men and women that were immured in such places as were fit only for the habitation of a *few* of the filthiest of the brute creation, and might delineate scenes as far transcending the horrors of that black deed with which the name of our own city is doomed to be eternally associated, as weeks and months are longer than the hours of a single night. And then he might describe a march over mountains that no foot but that of the chamois had ever trod since the beginning of the world, a march more interesting in a military point of view than that of Napoleon from Moscow. He might describe the reception of the half-dead refugees by the Christian citizens of Geneva, and the shepherds of the Swiss mountains. And then what more poetical than the fondness with which the exiled band clung to the memory of their own once fair but now desolated valleys, consecrated still more in their pious estimation by the shed blood and scattered ashes of their martyred brethren? Like the people of Israel in Babylon, they sat by the streams and rivers in the land of their exile, and mourned over their burnt cottages and their trodden down vineyards, and their desecrated churches, and still more over their massacred parents and friends and pious pastors; while some of the choicer spirits, like so many Alfreds, were nursing the quenchless flame of patriotism in the cottages of the peasants; and forming projects which to those who judge of human force and power by the prosaic rules of arithmetical computation, must seem the dreams of mad enthusiasts, but of which one who knows that almighty power fights with those who fight in the cause of truth

and righteousness might have predicted the success. And then the noble final struggle came—the ploughshares and the shepherd's crooks were converted into swords and lances, and the peasant band proceeded to defy the joint armies of Sardinia and France. England has her one Alfred, Scotland her Wallace and her Bruce, and Switzerland her Guillaume Tell; it is reserved for the Vaudois to boast of numbers whose names are worthy to be emblazoned side by side with those of these brave battlers in freedom's cause. We are not versed in the details of battles and seiges and escalades, but we believe all military men will bear us out in saying that the annals of war record not nobler deeds of daring or the achievement of more difficult undertakings than were achieved by the patriot band. Many a time they had forces outnumbering their own by many hundreds of times, and many sad reverses drove them to the very verge of extermination; but their spirit, and the blessing of God upon them and their cause, raised them superior to all reverses, and the glowing language of holy writ was shewn to be not the language of hyperbole but of sober truth; "one chased a thousand, and two put ten thousand to flight;" so true it is that

> Freedom's battle once begun
> Bequeathed by bleeding sire to son,
> Though baffled oft is ever won.

If there were a Milton yet on earth, he alone could fitly depict the various emotions of soul that glowed in the bosoms of these mountain warriors, when again they welcomed with overflowing joy the remnant of their wives and sisters to their valleys, now invested with a perfect sublimation of sacredness; and thought of those whose places were empty on that day of solemn festivity. It must have been as on the day when the remnant of Judah's captivity laid again the foundation of that holy and beautiful house where their fathers had worshiped. "And when the builders laid the foundation of the temple of the Lord, they set the priests in their apparel with trumpets, and the Levites the sons of Asaph with cymbals, to praise the Lord after the ordinance of David king of Israel. And they sang together by course in praising and giving thanks unto the Lord, because He is good, for his mercy endureth for ever towards Israel; and all the people shouted with a great shout, when they praised the Lord, because the foundation of the house of the Lord was laid. But many of the priests and Levites and chief of the Fathers, who were ancient men, that had seen the first house, when the foundation of the house was laid before their eyes, wept with a loud voice and many shouted aloud for joy. So that the people could not discern the noise of the shout of joy from the noise of the weeping of the people: for the people shouted with a loud shout and the noise was heard afar off."

The two works whose titles we have placed at the head of this article refer to the period whose history we have thus rapidly glanced at. The "Exiles of Lucerna" is a brief narrative of the sufferings, exile, return, struggle and final victory of the patriot band. The story is succinctly told and the description is graphic, rising in some passages to eloquence. The effect is however in our estimation considerably spoiled by the introduction of fictitious characters, and events that might have befallen, or which did befal different parties, but which are not recorded in history as having actually befallen any individual sufferers. If ever

it be untrue it is certainly true in regard to the Waldenses that "Truth is strange, stranger than fiction." And the narrative approaches so nearly to historical correctness that we cannot but regard it as an error in judgment on the part of the author to have deviated in any degree from strict historical accuracy. The work however is interesting, and deserves to be read by those who have not the opportunity of perusing the larger works of Gilly and Acland and Jones.

"ELLA" is a poetical composition by a townsman of our own, and therefore claims a somewhat more critical notice than we have deemed it necessary to bestow upon the "Exiles." Its heroine is one of those who have been immured in the dungeon of a convent, from which having made her escape she details her sufferings to the pastor of the village to which she returned to die.

As a poem it is deficient in incident. Although it extends to forty-seven pages, there are but three incidents in the whole ; the death of her mother at the stake ; the deliverance of the heroine from the violence of a monk by a thunderbolt which killed at once her ravisher and her sister ; and the death of a nun who when the convent was attacked by pestilence gave birth to a child in the captive's cell and immediately died. This last incident gave her the opportunity of escape, and on regaining her home she found to her surprise that it was again in possession of her compatriots. Her brother had been tied to the stake at the time their mother was burnt, but by some means or other escaped ; he was the pastor, though she knew him not, to whom she told her tale. And so far all well. But here we must hold our author's taste to be in fault. The brother turns out not to be her brother after all, but *more* than her brother. Now with all deference we submit that this is not as it should be. It is historically improbable, and poetically unnecessary. Yea it is more than unnecessary,it is prejudicial; of such a matter critics will of course judge differently, and therefore we shall not dwell upon it; but if the introduction of the love episode please the *many* ordinary readers we apprehend that it will displease the *few* of correct taste and judgment.

As a composition Ella is very far from faultlessness. Rhyme is evidently a burden which our author is not able to bear. We could quote many instances in which he staggers under it in evident distress, but one or two taken at randon will suffice. Witness the following,—

> "And in it still the dead bones lie,
> And skulls that gape and grin for aye.
> And skeletons chained in their sleep
> Uncoffined and unburiedly."

The two first lines are made to rhyme with each other by giving a vulgar and totally incorrect pronunciation to the concluding word of the second line, and the fourth is made to rhyme with these two at the expense of both grammar and ordinary usage. What has been said of fire and water is true of rhyme: it is a good servant but a bad master. Now it was evidently the rhyme that *compelled* our author to write the last line of the above quotation. Rhyme ceases to be an ornament to verse whenever it appears that a word is used for its sake which would not otherwise have been used. Take another example,—

> "I crept within a niche's cell
> Their very shadows by me fell ;
> They were on some unholy work,
> And brandished each a bloody dirk."

Now every reader clearly sees that the unusual and scarcely correct expression *a niche's cell* is used solely for the purpose of rhyming with *fell*; and also, the parties not being Scotch Highlanders, that it is for the sake of the rhyme, and that not a good one, that the monk and nuns are armed with a most inappropriate weapon. We might quote many more examples, but these will sufficiently shew what it is we find fault with.

The author acknowledges that for the original idea of the poem he is indebted to Lord Byron, and also that in various passages he imitates that writer. This we suspect is true to a much greater extent than he is conscious of. Various passages have struck us in the course of our perusal of Ella as unfortunate imitations of some of his most celebrated passages. For example,—

> "Ah! who can look on the sweet past
> That look,—that on the loved in death,
> In bitterness of soul is cast,
> On beauty without pulse or breath
> Laid in the tomb's all dark recess
> The lily in its loveliness—
> And wish not—weep not for it last."

The author in writing these lines evidently had in mind a passage which we quote from memory.

> "He who hath bent him o'er the dead
> Ere the first day of death is fled,
> The first dark day of nothingness
> The last of danger and distress
> Before decay's effacing fingers
> Have swept the lines where beauty lingers,
> And marked the mild angelic air
> The rapture of repose that's there, &c. &c."

Be it observed that both the passages are descriptions of a land whose glories are flown. Compare the following lines,—

> "'T were long to tell and sad to trace
> Each step from glory to disgrace."—*Byron.*

> "'T were sad to say and long to trace
> Captivity's dull round and race."—*Ella.*

Many such imitations might be pointed out, but we forbear.

If what we have said seem severe, we beg our readers, and especially Mr. Smyth, if our Review fall under his eye, to consider our saying it as rather complimentary than otherwise; for assuredly we should not have taken the trouble to notice such faults, if the poem had not had good qualities more than sufficient to redeem them. We have said, and we think proved, that it is far from being faultless; but it is as far or further from being meritless. The author's style is generally nervous, though not always correct; his images are vivid though not sufficiently varied,—and although his imitation of the manner of Byron makes him sometimes obscure, he keeps up the interest of his readers throughout his story. His poem moreover is pervaded throughout with sound religious principle, and a most salutary hatred of intolerance and persecution. The moral of the whole story is strictly that which is stated in the final lines of Milton's well known sonnet, which forms the motto both of the "Exiles" and "Ella."

> "Early to fly the Babylonian woe."

As we have quoted various passages for the purpose of shewing the

defects of the poem, it is but fair that we should give one or two specimens that will represent its excellency. We select first the death scene of the sister.

XXXIII.

"It was a moment dread of pause;—
I cannot tell thee what it was:
As hangs the rock ere down it dash,
Or avalanche its thunder crash,
So hung that dreadful moment there.
I heard her call on CHRIST's blest Name—
One last—one holiest, deepest pray'r:
'Twas answer'd!—for the red flash came
Through bar, and grate, and iron frame.
Down—down to Earth
Burst—blaz'd—out-leapt that lightning flame,
The bolt sped forth,
Riding upon that vivid beam,
Full on the dagger fell its gleam
Scarce follow'd by its thunder hoarse—
I saw a flash—I heard a scream—
A dismal scream, or curse, or yell,
As if it flew a shriek from hell,
In mutter'd execration fell;
And oh, tremendous righteous Heav'n!
Full on that sinful man 'twas driven—
Down roll'd the monk, a blacken'd corse—
Convuls'd—half rage and half remorse,
With eyes that glar'd their horrid ray,
Outstaring wild in death he lay,
Like precipice o'ertumbled horse,
Like chamois roll'd down glacier gray.

XXXIV.

I broke my fetter with a bound
For Ada too lay on the ground,
Pale—out-stretcht on the dungeon stone,
In lily purity cut down,—
Tho' not a scar the spot did mark
Where enter'd had the subtle spark;
I burst my fetter with a bound,
I threw my arms her bosom round,—
I felt no breath— I heard no sound,—
My suff'ring sister,—she was gone!—
Without a pang, or sigh, or groan,
From woe and grief at once delivered,—
Ev'n as a viewless angel flown!
And thus of life this last link sever'd,
This last best blessing thus struck down,
With every hope on Earth now shiver'd,
Like wretch condemn'd to mis'ry thrown,
To more than mis'ry all my own,
I felt—I felt—I was alone.

XXXV.

I rav'd not—wept not—did not feel—
I was become as stone or steel—
I did not mark my pulse to throb—
I could not speak aloud nor sob—
Nor found my whirling brain to reel—
A darkness horrid on me fell;
How long it staid I could not tell,
I only felt I did not die—
I only breath'd within that cell—
I only liv'd—*I* only, *I*
Was doom'd within that den to dwell,
In that black dungeon as my hell,
In broken-hearted misery!"

Our next extract, and it is the only one our space will permit us to insert, is one of much beauty, though destitute of the merit of originality*:—

XLIII.

" Time roll'd along its changeless tide;
Days, months, ev'n years away did glide:
I lost all count of days and years;
I might as well have counted tears:
But it might be, as I may guess
Some seventy moons, or more, or less.
I sometimes fear'd the loss of speech,
Thus bar'd from human sound and reach:
For though my keepers came each week
To dole my bread, they scarce would speak.
I talk'd aloud to mark the sound
Of my own words, as I walk'd round
The limits of my dungeon ground;—
It had a drear sepulchral tone
As it echoed from that gothic stone;—
Or to the very birds would prate;
For they were grown compassionate,
And oft came to the iron grate,
And sang in pity of my fate;
And one ev'n caught the infant hymn,
My father taught me on his knee,
'Twas like a young stray cherubim;
Of starry eye and golden wing,
And seldom fail'd to come to me;
And would with such a sweetness sing
I could but love it, for it was
The only thing I had to love,
And lov'd me deeper far, alas!
Than man who sternly, darkly strove
To bar from me all earthly ties,
And shut the gate of Paradise!
And this became so tame a thing,
'Twould nestle in my breast and sing,
And bill my mouth as if to kiss,
And flutter o'er me with its wing
That I might yet some sorrow miss:
I call'd it 'Angel,' for 'twas sent
My solace in imprisonment;
And oft beguil'd me of my tears,
And had now been with me some years:
But this, like all, was earthly too;
One eve, at length, away it flew—
Strange! 'twas the last week of my stay
In that dread den, nay the last day—
Yet my sad heart began to fret,
And murmur, thus 'twas ever yet,
That what I sought should ever fly,
And shun my sad society!
Whilst that sweet bird, its mission done,
Had now but to its wild home flown;
And I, alas! knew not how nigh
Was ended my captivity.
And I myself should have to fly;
Yet my vile heart was murm'ring there
Just when was ending all my care—
Just when was answered ev'n my pray'r!"

Considering the limited extent of the European community in Calcutta, it has been prolific in poetry. We remember at this moment

* "A light broke in upon my brain, It was the carol of a bird, &c."—*Byron.*

besides Derozio and Emma Roberts, the authors of the "Literary leaves," the "Draught of Immortality" and the "Sunnyassee." We suppose Capt. Richardson is generally admitted to be the Laureate of the City of Palaces. 'Ella' is not inferior to the Draught of Immortality or the Sunnyassee in poetical merit, and very much superior to them in its moral and religious tendency. If Mr. Smyth had chosen for himself a purer model than Byron, or better still if he had eschewed imitation altogether, his name would have stood higher. As it is, it is no small praise, that, imitating as he does so closely the manner of the gloomy bard, he has kept his songs so perfectly free from the impure and misanthropical matter that defile and vitiate so much of Byron's poetry.

Transactions Agri-Horticultural Society of Western India, 2nd Quarterly No.

By the kindness of Dr. Giraud we have been favoured with the second quarterly issue of the transactions of the Agri-Horticultural Society of Western India.

In our last number we gave copious extracts from the first quarterly publication of this new series of the society's transactions, and expressed the favourable opinion we entertained of the useful and interesting nature of its contents generally : we have now equal pleasure in bearing testimony to the importance and value of the various matters contained in the issue before us.

The Society, we regret to find, has been deprived of the services of gardener Mr. Shannon : the loss we trust will be quickly repaired, as it appears from the report of the Secretaries Dr. Buist and Dr. Giraud, that not one third of the labour is produced under the native superintendent and head Mallie which would be done under the most ordinary European supervision. The evil here complained of is not, however, the only one, a " worse remains behind ;" even these tardy movements are brought to a full close when any operation of a novel or unusual character is for any period placed under their care. This, however, though we have called it the greater evil of the two, is of the two evils the more likely to be sooner remedied ; it is, we believe, much easier to impart knowledge than to eradicate habits of indolence and inactivity. Dr. Johnson, indeed, said " you cannot cure laziness Sir," and the Doctor, no bad subject, if we may take his own assurance, acknowledged that he had experimented on himself all his life. We do not, however, fully subscribe to this dogma of our learned countryman. As regards the native character, much of the apathy and indifference under which its best points lie concealed, may be conquered and shaken off, and a new life and spirit as it were infused. To effect this they must be made to see that their stake in society is worth playing for, and if we may carry the figure a little farther they must even be taught to play the game on a better system.

We observe with regret that the publication of the transactions of the Society has not received that encouragement from the members

generally or from others interested in Indian Agri-Horticultural pursuits which we think it deserves, we shall be happy to learn that this drawback on the financial prosperity of the association is a *diminishing quantity*.

In other respects the affairs of the Society appear to progress in a very satisfactory manner; the Gentlemen to whose management they are confided manifest every disposition to render the association one of public benefit and advantage. We highly commend that portion of its economy which relates to the distribution of prizes amongst native competitors. The mere remuneration of gentlemen's Mallies, the report informs us, is matter of almost no consideration: "it is the promotion of the remunerative culture on the part of the natives themselves, and that on a considerable scale, that the Society has in view;" and whilst the Society adheres to the practical developement of this principle its tendency must be to beget and encourage a spirit of enterprise and activity amongst even the humblest of that class, to whose peculiar pursuits and labours this exciting principle directly applies.

An instance in point is presented in the report before us: we refer to the case of Bala Benbra, a native cultivator of sugar, who at the May meeting brought to the Society samples of sugar which he had produced. Dr. Gibson, in a letter to the Secretary recommending the exhibitor to the favourable notice of the Society says, "He learned the art last season, and practised it this season on the farms of two men in this vicinity. The total quantity he manufactured amounts, by my estimate, to about 3200 lbs." From this we may infer that the man himself was neither in a situation or in circumstances to make the experiment on his own account, but this has not been a barrier to the acquisition of practical knowledge nor prompt application of it to a good and a useful end; others have, indeed, benefitted largely, it may be, by his superior skill and well directed labour, but "he has his reward." Although we have not in this case any direct proof that the hope of reward had been the prime mover, we may safely affirm that that hope was not without its due influence: however that may be, the good to be effected is not the less apparent. Industry and zeal will be stimulated amongst the very class of persons who would appear to be the least likely to benefit directly by such associations or the rewards they hold out. It is highly creditable to the good feeling and liberality of the Society on this occasion, that although the prize was claimed under a misconception, as the spirit of the conditions usually annexed to the award of prizes had been complied with, it was determined that the prize should be given; the matter was remitted to the Garden Committee with authority to give 150 Rupees, or the equivalent of a Garee and Bullocks, to Bala Benbra for the production of 3200 lbs. of Sugar.

The present number, as we have intimated, is full of interesting matter, by far the greater portion original communications of a highly useful and practical nature; from these we do ourselves the pleasure of selecting two articles for the pages of the 'Review.'

"*Remarks upon the Common Wheel Vehicles of Western India—Some Plain Notes regarding the Principles of Draught, intended for the Use of the Natives—With*

attempted Improvements upon the Labour Carts in present Use among them. By Lieut. Gaisford, of the Bombay Artillery. (*Presented for Publication by Government.*)

In countries unprovided with roads, where the surface naturally permits the employment of wheel carriages in operations of husbandry and transport, local peculiarities have prompted the invention of vehicles, various as the districts wherein they have originated, some of them well adapted to their particular intention, but few at all suitable for general use.

We are familiar in the West of India with a great variety of these, from the simple cart on which the "Wudaree" hales stone from the quarry, having buffalo horns stuck in to form its sides, and hobbling upon wheels so eccentric as to belong sometimes as nearly to the square as the circle ; the wicker baskets of the Sassoor neighbourhood, &c. rolling on two rudely rounded stones ; the ponderous cart of the Deccan Koombee, with wooden axle and low solid wheels, devolved their several generations from sire to son, furrowing up the roads like a plough : next in gradation follows the Konkan garee, probably of Portuguese introduction, and nearest of all in approach to the forms we approve—the light high-wheeled, but top-heavy carts which sometimes find their way hither from the Madras districts.

Two carts, of plainly indigenous birth, are here introduced as examples, of the best and worst of their kind we have met with, viz. :—

Fig. 1. [Plate 20] The Delhi cart proved excellent, by the astonishingly good condition in which we found a number of this construction after performance of the distance from the Bengal provinces to Cabool, laden with stores. So simple and inexpensive are they that we might recommend them, with the mere addition of tyers, and trifling increase of the wheels' height, as possessing every quality desirable in the circumstances of this country.

The only iron in their whole frame is that used to bolt the transoms to the side beams, and two pins for axels, with nave bushes : the outside bearing upon these pins gives all needful strength, while the small diameter of the axle reduces its friction to a very trifle. Three bullocks are usually driven in these carts "Unicorn ;" an upset (and accidents were frequent) appeared to cause little harm : in fact no injury is likely to occur that cannot be repaired by the driver then and there.

Reserving the other particulars concerning this ingenious cart for annexation to the sketch, we now present a second example, [Fig. 2] in which, besides its unmitigated rudeness, there is nothing remarkable but that, being in very common use in Lower Scinde, the machine should never have advanced beyond the very first step in the application of principle upon which the slightest mechanical ingenuity must impel advances.

The principle member of this primitive invention is a crooked branch A, forming at once the pole and one side of the body. Another branch B, with five tranverse sticks, completes it. Two pegs on each sidebeam confine the axle, which is of wood, revolving with the pair of Wheels, and creaking vilely.

Of the Guzerat carts it may be said, with those described p. p. 315 and 316. that they are excellently suited for their purposes ; our present business, however, is with carts intended to travel on made roads, which reduce the thoroughfares of a country so nearly to an uniform solidity and level, that a single good model is all we need to seek for supplying every use wherever such artificial roads extend.

Some principal lines of traffic in this presidency, in consequence of such improvements, now encourage an extensive substitution of wheel vehicles in place of the difficult and costly transport upon pack animals : a remodelling of the unsuitable conveyances now existing for the heavy produce of the interior, and the promulgation of the experience on the subject of draught collected in countries where it has longest been used and is best understood, have, therefore, become worthy attempt, and promising of utility.

We propose, then, to consider, with special reference to the circumstances of this country, what form and dimensions of cart is preferable for adoption here—the reasons of preference, and the question how the expense of draught may be best economised, and the durability of roads prolonged.

Two interests, not usually acknowledged kindred, will thus be viewed together, for we believe it will appear in the inquiry that the advantage of the party at whose expense the highways of a country are maintained bears close relation to

that of the industry trafficking upon them. At the conclusion we shall offer designs for one light and one heavy cart—cheap and simple—culling and adopting, from every variety we have observed, well tested contrivances, and combining all to the best of our skill, for farther experience to approve, and the ingenuity of others to perfect

In order to comprehend how animal power can be most beneficially exerted in the draught of a load upon wheels, we must examine the sources of resistance to their revolution, and these are three, viz —

1 —Of the Road's surface
2 —Of Friction at the Axle
3.—Of their own Weight

The perfection of roads is to be even and unyielding—qualities which, in practice, none but railways possess The resistance arising from their inequality and softness is, however, greatly reducible by giving all convenient height to our wheels, and scientific experiments have determined this reduction to be proportionate to their increasing diameter *, but to speak popularly, it is plain that, in proportion as a wheel is larger it will roll more smoothly across hollows, into which one of less diameter must descend , that it takes more time to surmount the same obstacle than one of less height , consequently, with large wheels, the cattle have to exert an effort less violent, although more prolonged, than with small ones, and this is easier to them for the same reason that makes it better to ascend a hill by a gradual than by an abrupt slope

The injurious action of low diameters may be observed by placing pebbles before wheels, small and large, in the ordinary sense, heavily laden , by the first, if the ground is slightly compressible, the stones will be thrust *forwards* and *into* the soil, if it is solid they will be driven before the wheel or pushed aside , by the second, they will be pressed into the soft road or crushed upon the hard, without changing place—an effect much less destructive of roads, and obviously less prejudicial to draught

Here the individual and the public interests are indentical The small wheel which displaces the materials of a road must again and again be dragged by the cattle against obstructions which the high wheel surmounts or crushes once for all. It is manifest, too, that all concussions sustained by a road must react upon the carriage to the injury of its frame and lading, the check of momentum, the discomfort and fatigue of the team

Can a wheel, then, be too high ? Yes , for weight is an important consideration, so is cost, and the strength of materials, but principally the due inclination of the line of draught should govern its diameter, for within this limit neither weight, stability nor expense, are affected to the carriers' disadvantage, and this subject we shall return to in describing our Models of Labour Carts

The preservation of roads and their resistance to draught depends on another quality of the wheels, namely, their width of tyre , and here again the good of the road accords with that of the draught beast and his owner In soft ground ruts are shallower, proportionately with their breadth, but the advantage of broad tyres, whether to the road or draught, holds good to a certain extent only Experiments have shown that even in sand the benefit ceases at the limit of about 8½ inches Widths, much exceeding this, have in some parts been encouraged by law, under misapprehension of their real impression on the roads, which, consisting of materials varying in size and obduracy, it results that the weight, instead of being diffused equally over the whole breadth of rut, infringes

* The following are extracts from a report of a committee appointed to give an opinion on some Tables of Experiments presented to the Academie des Sciences by Lieutenant Morin of the French Artillery —

"Ses experiences, en nombre de 40 mettent suffisamment en evidence cette double loi, que le tirage est proportionel à la charge, et en raison inverse du diametre des roués.

"Le peu d' accord entre les observateurs qui ont précédé M Morin faisait desirer un travail plus exact et plus complet Les ingenieux appareils dynamometriques, pour lesquels l' auteur a reçu un prix de l' academie, devaient trouver ici emploi." &c.

mainly upon a few prominences extravagantly wide; tyres, therefore, are merely useless aggravations of a load.

Width of tyre is advantageous only when wheels are cylindrical; if they are coned, the wider they are so much the worse for both road and cattle. (Fig. 3.)

On "Pavements" width has no influence, because, as is evident, the broadest tyre can only touch them on a few summits. This may be seen by observing from the front, a wheel as it advances towards you, or by examining the trace it leaves.

On a good "metalled road," or on the same in different order, provided the foundation is firm, width beyond 4 or 4½ inches produces no equivalent benefit; but such is not the case on roads made of friable materials, such as "Mooroom," and the softer these are, by so much, within the limits before indicated, should the wheels be broader. Exception is of course due when the loads are not excessive, as will be noticed under the proper head.

Thus it appears that width of tyre is, on the one hand, no just scale by which to apportion decreasing highway tolls to the encouragement of overdue loads and consequent crushing of material in spite of it; neither, on the other hand, should it be neglected, for where the road is very soft the depth of rut is, as aforesaid, less in proportion to the tyre's greater width. Both considerations together have led to the conclusion that about 4 inches is the best for moderately heavy draught on ordinary roads—such wheels might carry 15 cwt. each, without injuring the road, and to sustain that weight, wheels of the above breadth need not be too heavy in draught.

The second impediment to a wheel's progress is axle-friction—an amount dependent upon the pressure of the load, upon the nature of the axle-arm and its box, and upon the wheel's fitness or unfitness of form to roll naturally in a right line.

Friction arising from pressure (except of extremely heavy weights) is, on the same axles, with equal loads constantly the same and proportioned to the load's increase or diminution—that arising from the grinding of the axle arm in its box varies very considerably with the different materials—of these iron is the best, and with such well made and well lubricated axle friction amounts to about 1-8th of the pressure—a quantity again diminished by the leverage of the wheel's radius.

It is common to suppose that axle friction is lessened by diminishing the contiguous surfaces of the box and axle. Under this impression some have proposed polygonal boxes, and others will tell you that a wheel runs lighter with bushes at each end of the nave than with entire boxes; in fact, however, these notions are merely fanciful, the friction in all is the same if all are equally well made; but it does not long remain so, for, of the above contrivances, the first would soon wear loose; and the second, which is the common usage of this country, prematurely destroys the axle, both effects being prejudical to draught, from the wabbling of the wheel in the one case, and the cutting and grinding of the bushes in the other. The boxes recommended in the models following are made with plate iron—cost no more than the bushes above mentioned as destructive of both nave and axle, and we have proved the substitution good.

The same expedient whereby the road's resistance is better overcome reduces the resistance at the axle also—namely, giving the wheel the largest diameter admissible—because the leverage of the wheel's radius, as compared with the radius of the axle, affords a purchase constantly increasing in direct proportion to its length.

Axle friction is influenced moreover by the form of wheels independently of their size.

An undished wheel revolving on a straight axle arm follows naturally in a right line, creating no avoidable friction. Such a wheel is the cheapest to make, the easiest in draught, and the least hurtful to a road.

But with vehicles of heavy burden this construction wants strength to resist the lateral shocks constantly occurring on bad roads; hence the practice of dishing and inclining the wheels.

This construction produces no noticeable injury to the roads with light carriages, while it introduces the following valuable qualities:—

1st, Strength, combined with lightness, and a certain degree of elasticity in the wheel, to elude the rapid shocks of quick draught.

2d, Aptitude for running on a bent axle, still presenting the spokes perpendicularly to the weight, while, the inclination an axle so bent gives to the wheel,

casts the mud and dust of the road clear of the carriage, and allows a copious supply of oil for lubrication of the axle, to rest in a reservoir at the depressed end of the nave. This construction is also said to allow of expansion and contraction in the wheel; but the fibres both of spokes and felloes run longitudinally; in which direction wood is not liable to swell or shrink.

A certain amount of axle friction is created by the tendency a wheel thus inclined has to fly from off the axle in a circular path, the centre whereof is at the point where the axle-arm, prolonged, would strike the ground. This amount, however, with a wheel of dish no greater than is due, to attain the advantages above described, is very trivial, and partly counteracted by another tendency natural to the same form of axle, viz., that of constantly *sliding up to the collar* at the axle shoulder. The inclination has yet another advantage, it *balances the wheel* which will not, like a straight one, stand in equilibrum vertically; and farther, when the wheel descends into a hollow, the main shock falls at *a.* where the axle is strongest. (*vide* Fig. 4.)

But the case is different with heavy vehicles, in such avoidance of dust and splashes is no desideratum, for the pace is not fast enough to cast them up, neither is there inducement for thus securing a supply of oil, for lubrication is well enough effected in a ruder manner; the necessity for strength, however, remains, and must be provided for.

It has already been affirmed, that neither those who use a road, nor those who maintain it in repair, can profit by thwarting one another; the injury both suffer when this attempt is made, is well illustrated in the instance of the Road Waggon,—no longer common on English roads, but deserving rememberance for examples of the truth of our affirmation.

These waggons (full accounts of which are given in the U. K. Society's Treatise on Draught, P. 438) carry upwards of a ton on each wheel. Now, if the entire bed of the road were of similar consistence, 8½ inches tyre would, according to experiments carefully made, run easiest in draught, but the carrier prefers a width of three or four inches—firstly, because wheels of that dimension are lighter and cheaper, and because they arrive at the solid bottom of the road without having to displace and drive before them so much of its loose upper coating. Bad roads abounding in deep ruts and hollows oblige him to dish his wheels, i. e., insert the spokes obliquely into the nave (Fig. 5)—the advantage of presenting the spokes perpendicularly to the weight makes it at the same time necessary to give them a corresponding set off, (as in Fig. 4) by bending down the axle arm the tyre, it will be observed, no longer presses evenly on the ground, and the road-makers, discovering that the enormous pressure bearing on so narrow a surface cuts up the road and crushes the stones to powder, compel the carrier, by prohibition-tolls, to widen the tyre three or four fold, and to make them press flatly on the ground. From the necessity of providing stiffness to withstand the lateral shocks he is unable to dispense with the "dishing;" but if retaining that, he seeks to comply with the regulation as to width and flat bearing, by placing his dished wheel on a straight axle, (fig. 2,) he sacrifices its strength for resisting vertical pressure, the angle at which the spokes spring from the nave becomes only so much leverage (e. d. Fig. 2) for aggravating axle friction, and straining their joints—the wheel, from its preponderance on one side, bears heavily inwards—the consequent unequal friction at the upper surface at the axle shoulder, and under surface at the linch, wears away the end of the bush—the wheel falls gradually more and more inwards—the grating and straining become worse, and wheel and axle are prematurely worn out.

Reduced by an absurd law to a choice of evils, he adopts conical wheels of enormous weight, and compels them, in contravention of their natural property, to follow the same straight path as if they were cylindrical, thus obeying indeed the letter of the law, but at the detrimental expense of two or three horses' power for the extra draught of a machine which grinds the roads to morter.

Conservation of a road merely demands the use of wheels proportioned in breadth to the load they carry, perfectly cylindrical, to cause no grinding of material, and of the largest convenient diameter, that displacement of the surface of the road may as much as possible be avoided.

Economy of draught requires the same properties, but combined with others, irreconcileable with the foregoing, according to the ordinary construction of heavy vehicles, although of easy attainment. They are possessed by Jones's Patent Iron Wheels, now extensively used in England, and in those of the second of the two patterns, which we now proceed to describe.

No. 1.—*Light Labour Cart.*

[Plate 20 Figs : 7. 8 & 9.] This cart is calculated to carry from half a ton to 12 cwt., and accommodated to the height of the common bullocks of the Konkun and Deccan, one pair of which is equal to draw such a burden on ordinary roads.

It will not exceed the cost of a well constructed Konkunee cart (Rupees 40 to 50 at most) and we have endeavoured to give to it certain desirable qualities wanting in the latter, and best exhibited by opposing to them the defects we object to.

Objections to the Konkunee Cart.	Obviations of these in Model.
I.—Line of Draught too oblique, thereby making the animals lift instead of draw, more than is expedient, unless the cattle are very muscular, and the loads very bad.	Line of traction better accommodated to the size and powers of the cattle wheels : more favourable both to the roads and the draft.
II.—Connection between load and wheels broken by the loose method of fixing the body to the axle, and interposition of two or three blocks between them, allowing of play and consequent waste of momentum.	These parts rigidly connected, simplified, lightened, and greatly strengthened.
III.—Frame clumsy and weak, and altogether a piece of bad carpentry.	Greater strength obtained with less material ; any part that may break is readily removable without dismemberment of the rest.
IV.—Bushes of the nave consist of two rims of iron, which, having little hold of the wood, are apt to get loose and destroy both nave and axle for want of more extended bearing on each.	Boxes made of iron plate, running entirely through the nave,—a contrivance not dearer, more durable, better for lubrication, and causing less attrition of the axle.

Linchpins of improved form are introduced, after a pattern we admired in Tuscany for its effectiveness and simplicity—nothing but the human hand is likely to remove it, a simple and effectual friction drag is also appended, a contrivance destructive neither of wheels nor of roads.

[Dimensions of No. 1.—Axle—of iron 1 inch and $\frac{3}{4}$ square, cylindrical arms $1\frac{3}{4}$ inch diameter. Bed 3. 9 inches long ; $4\frac{1}{2}$ wide, 6 deep.—Wheels upright 4. 6 high. Tyes $2\frac{1}{2}$ inch, Naves 11 inch long, 10 inches diameter barrelled for convenience of hooping the Nave. Spokes thick $1\frac{1}{2}$ inch. Wide at Nave $3\frac{1}{4}$ tapering to tye.—Felloes $2\frac{1}{2}$—deep $3\frac{1}{2}$.

Fig 13, plate 20, may explain the windlass for binding bulky loads to a cart. The ropes are inserted into clefts at the end of the roller *a. b.* two short levers *b. b.* shipping into holes *h. h.* wind the rope taut, and being left in the sockets hold the load firm as long as required. N. 2, with a heavier wheel and Axle would answer for $1\frac{1}{2}$ tons ; but is here shewn with wheels similar to those of No. 1 which are sufficient to sustain any weight of light bulky goods that can be conveniently laden on a cart. The frame *b* is supported additionally by a bar *a*, resting on the Axle, and removable at pleasure.]

No. 2—*Heavy Labour Cart.*

[Figs : 10 11 & 12.] For conveyance of cotton, salt, and heavy merchandise along the roads of the interior, economy of wear and tear, and of human labour, recommend carts of larger capacity, drawn by longer teams than would be convenient in the narrow and crowded wharfs and streets of Bombay.

No. 2 is proposed for these purposes, and proportioned to carry one ton and a half, to be drawn by six bullocks, yoked three abreast.—a mode which, however it may savour here of innovation, is the common and accustomed way of harnessing in Europe, and has approved itself to us, after extended and careful observation, as particularly advisable for introduction here.

It is indispensable to our profit and success in competing with other countries for the supply of bulky produce, to seize on every means of cheapening its production. A commodity fetches its price in the market, come it whence it may :

and every farthing we can rescue from outlay on its transport thither, is so much gained, or so much left available for disabling competition in other quarters, and so extending our own vent.

The main staples of Bombay are largely derived from far inland by costly modes of import. The cart here proposed is calculated to reduce this expense: firstly,—in human labour, for one man can perfectly well drive six bullocks thus harnessed; secondly,—in animal power, for the line of draught is most favourable, or, in better understood terms, the traces have a proper inclination, and the cattle are "close to their work." It must not be objected that such a team engrosses too much of the road, for after all, it requires no more frontage than many carts do.

Furthermore, the shafts are sustained by three bullocks instead of two, and the beasts draw from two fixed points, instead of one unsteady one.

A simple and portable windlass, universally used in southern Europe, is added as an appropriate implement for binding cotton bales, hay, &c. A friction drag is applied to both wheels for the descent of ghauts with full loads, and we adopt wheels of the construction known as Surat wheels, and highly approved of in the "Treatise on Draught," p. 442, observing in their dimensions the principles we have endeavoured in this humble essay to explain and recommend.

P. S.—The plans and elevations accompanying this paper are imperfect. No 2 is represented with light wheels and axle. The up-country carts come to Bombay laden for the most part with light bulky loads, and return with salt, iron, &c. For heavy loads *both ways*, six bullocks and heavy wheels would be most suitable. For light loads down, and heavy loads up, the cart should be made somewhat lighter, and the light wheels and axle, not be loaded beyond 15 or 18 cwt., for which three bullocks would be sufficient in either direction.

(Signed) THOMAS GAISFORD, *Lieut. Artillery.*
(True Copy) L. R. REID, *Chief Secy. to Govt.*

Bombay, 25th April, 1843.

HORIZONTAL WIRE FENCES.

I am not aware of how long it may be since the elegant species of park enclosure, known by the name of the Horizontal Wire Fence, first came into general use in England, nor to what particular party we are indebted for its introduction. Over many of the southern and central counties it has been most extensively employed for a period of about twenty years, and found equally remarkable for its elegance, economy, strength, and durability. It was, I believe, first introduced into the midland parts of Scotland, by the late Sir Alexander Muir Mackenzie, of Delvine, about the year 1833: he substituted wooden uprights for iron ones; and in the course of a few years, had no less than fifteen miles of wire fence set up on his estate. It subsequently came into very general favour, chiefly as a fence for parks and pleasure grounds in all parts of the country. Mr. Oliphant of Condie, late M. P. for Perth, first resorted to it for the enclosure of the poor hill pastures of the Ochils, which are, many of them, so little valuable, as to be undeserving of the outlay any other variety of fence would incur.

It occurred to me on observing the enormous area required for a hedge of prickly pear, and the harbourage for every variety of filth and vermin afforded by it, that wire fences would in India become excellent substitutes for this for the enclosure of compounds: and that with still greater expediency and benefit might they take the place of the heavy, unseemly, and expensive, stone walls, and clumsy and costly railings with which the dwelling places belonging to the wealthier of our natives are usually surrounded. A considerable quantity of wire, at the desire of a friend, was accordingly ordered from home; but somehow the standards were mis-sent; and a difficulty existing as to the manufacture of these in Bombay—probably the worst place in India to get any piece of blacksmith work out of the ordinary way executed,—the wire still remains in the godowns unused.

Meanwhile the fences of the garden of the Agricultural Society having gone to decay, and an estimate for the construction of the most inexpensive variety of stone wall that could be erected having been taken in, I suggested that, as a wire fence could be brought out from England, and set up at little more than one half the price of the wall, that this should be adopted in preference. The sug-

gestion was [illegible] 400 yards of fence, 4½ feet high, and consisting of 9 horizontal wires, was accordingly ordered [illegible] the details of this, particulars will be given by and bye; it is enough to st[illegible] that though the setting up of the fence was attended with more cost and delay than was anticipated, it has realised the expectations of the Society: and excited from its appearance the admiration of most of those who have examined it. Before further noticing this, however, it will be better to give a general account of the nature of the fence under consideration, the mode of its construction, and cost at which it may be set up in India.

The fence consists of strong uprights of wood or iron, called straining posts, with lighter intermediate ones at short distances, through all of which the horizontal wires are drawn. The first named of these are strongly fastened into the ground, and have spurs or stays attached to them. It is unnecessary to speak minutely of the mode in which these are made fast—this will be at once understood by inspection of the drawing [Plate 21.] The iron posts are battened with lead into blocks of stone—the wooden ones are fitted up with a sole piece, and struts—they ought to be sunk from two to three feet into the ground, and made extremely firm and secure: a want of due attention to this point being the error most generally committed by beginners in the setting up of fences. The wood ought to be lightly charred when under ground, and well pitched or dammered over. I have set up straining post without a sole piece where tne rock in its natural position could be made use of for stepping the upright and strutting the spur—but unless the utmost attention is paid to this, the post is so apt to give way, and the wires to slacken, that I cannot very greatly recommend the plan.

There is no very exact rule which requires to be observed as to the distances at which the straining posts ought to be placed from each other—where the fence is straight, 200 yards is not at all too far:—those along the terrace at the Society's gardens are 180 yards from each other, and are found not inconveniently remote. Where the fence is curved, the distance ought to be less, this being regulated by the nature and amount of curvature.

After the straining posts there are two varieties of uprights: the one kind are pretty strong—if of wood, deeply sunk and well secured into the ground—if of iron, battened with lead into blocks of stone about 20 or 25 inches cube, the larger the better. These ought to be placed from 50 to 70 yards apart from each other. For the lighter uprights, I have found bamboos to answer remarkably well—they are slightly charred and pitched, and sunk about two feet into the ground, having holes drilled for the wires to pass through. These are probably the best and cheapest uprights that can be had—they ought to be from 1½ to 2 inches in diameter.

Iron uprights are made of the lightest sort of bar iron 1½ inches broad by ½ inch thick, perforated for the wires, and inserted into a block of stone 10 to 12 inches cube, the larger the better. They should be placed from 6 to 8 feet from each other.

The stone requires no dressing whatever, and care should be taken that the hole made for the reception of the iron is at least two and a half inches deep. The natives are apt to make it a great deal too wide, this incurs a useless expenditure both of labour and of lead; and besides this waste, it makes much less secure work than when no more than a quarter of an inch or so is left all around the iron. The lead when cold should be driven up with a blunt chisel. The hole should be made to spread out a little, or be somewhat wider at the bottom than the mouth—this tends to secure the upright as if by dovetail. The blocks being all carefully placed along the line of the fence, the uprights are put in their places—a hemp string being drawn through the top hole to make the line eye-sweet; a second string is stretched along the ground, to which the edges of all the uprights are carefully brought up,—they are then secured with lead. Considerable nicety is required in this, as the fence looks most unseemly if any of the uprights deviate from their proper positions. The surfaces of the blocks should be so disposed as to permit two or three inches of earth to be thrown over them, so as to bring them up with the level of the ground, and conceal them entirely from view.

It is considered better to bat in the uprights first and then set the blocks in which they are inserted into their places in the ground. I have here pursued in part the opposite plan; it does not appear very material which is adopted. If the blocks are of free stone they ought to be considerably larger than when of trap or granite. The earth should be very gradually filled in, and carefully beat and driven down about them.

The line of fence being now prepared, and the upright[illegible] receive the wires, the next thing is to prepare the wire for insertion—for which purpose it first requires to be straightened from the coil in which it arrives. The wire, as has been already stated, is the finest and toughest kind of what is called charcoal wire: even when received as drawn, and with its original bright surface upon it, it has a very small degree of stiffness or elasticity, and may be twisted about with as much ease, and is as difficult almost to break as lithe copper wire.

The tools required for the further construction of the fence may be described as the manner of their use comes to be spoken of.

The first is a PEG BLOCK: it consist of a block of hard wood, 18 inches long, 5 broad, and 2 thick. It has strong pegs of iron inserted into it in the manner indicated by [Fig: 5. Plate 21.] Each particular variety of wire has a block adapted for it,—if wire thicker than was intended is attempted to be stretched, then it will come out zigzagged or wriggled, like that which has been wove in gauze: if too thin wire is drawn through the block, then the straightening process is imperfectly performed. The size of the wire as fitted for the tool is indicated by the portion placed along the line of the pegs to diminish friction, and may be easily judged of by the eye.

The peg block is made fast by a bit of wire to a tree, a straining post, or anything most conveniently at hand, and not apt to yield. The coil of wire is now unbound, and one end of it is passed through the staple at the end of the block, and along betwixt the line of pegs; enough of it being drawn through to make a loop through which a strong bamboo or piece of wood, six or eight feet long, should be passed; the loop being made tight about the middle of this so as not to slide, three or four coolies then take hold of the stick and pull the wire along. The person, meanwhile, who holds the peg block up with his left hand grasps the coil of wire firmly in his right, and hitches it rapidly around, as fast indeed as the drawers can pull it out. Where this is done by natives one man commonly takes the coil in hand, and another holds the peg block; an European can manage both with perfect facility. Care must be taken to permit no loops or twists to pass through the pegs, as it will afterwards be found difficult to straighten them. The wire must never be permitted to run off the coil spiral-wise, or it will be found impossible thoroughly to extend it; it must be uncoiled exactly like yarn placed upon a reel. This fact I found the most difficult of all to impress on native workmen. The various lengths of wire should be laid along the line of fence nearly as they are to be put through, and should on no account be bent or twisted unnecessarily after they are stretched. The straightening process, which has thus been described at such length, is, when rightly gone about, a remarkably easy and rapid one—one at which the natives speedily become very expert. But if the plan here laid down be departed from it will be found combrous, circuitous, and troublesome.

The wires are now to be run through the holes in the uprights; this is also accomplished with very great celerity. The three uppermost wires are the thickest; the four next are of intermediate size; and the two lowest the thinnest:—that is on the supposition that it is a nine-wire fence, and that wires of all the proper sizes are at command. As a general rule, it is sufficient that the thickest wires be placed uppermost, and the thinner ones lower down; the thinnest being next the ground. I have put up wire fences here which suit very well with wire of one size only.

The ends of the wires having been passed through the first straining post, and turned round one half the post, the end must be twisted twice or thrice round the horizontal portion which forms the fence. This is effected by a stirrup-like tool, [Fig: 6 Plate 21.] Which is taken in the hand, the wire being thrust through any one of the four holes which most nearly suits it. When the wires require to be united, they are first turned back and hooked into each other, and then turned round so as to form a tie like that of a bell wire; the tool just mentioned suits very well for this, though a wooden block 7 inches long by 2¾ broad, and 1½ deep, with a couple of pegs in it, [Fig: 7.] is now more commonly used. The proper performance of the tying process conduces greatly to the production of a neat and workmanlike job; beginners are very apt to be negligent and slovenly; this is a thing the more inexcusable, as perfect neatness and finish is very easily attained by a little care. When the knot is finished and the wire finally straightened, all the ends ought to be cut off with a common triangular file. The diagram [Fig: 8.] represents a properly tied knot where the wire is of medium size.

The wires being now drawn through all the uprights on to the part from which

it is proposed to apply the screw, are passed about six or eight inches through this.

The screw itself consists of a strong rectangular frame 24 inches long, the cheeks being 3 broad, and half an inch thick, and the distance betwixt them 4 inches. Along this moves the screw, with a vice at its extremity, kept in its place by the cheeks or guides as represented in the diagram [Fig : 9.] The end of the wire is inserted in the teeth of the vice, and pulled through so as to let the abutting plate *a* come in contact with the straining post. A piece of wood about 2 inches thick is placed immediately on the under side of the wire, and betwixt the abutting plate and the straightening post, this permits the easy application of the collar vice (whose use falls next to be explained) immediately above the wire. The screw is now pulled out by the application of the levers at *c* and *c*, till the wire is drawn to its proper rightness. It ought to feel perfectly rigid, and like a bar to the hand all along. The tyings should now all be examined—if any of them hâve given way, which they will only do in cases of very slovenly workmanship, they must be renewed—the wire which has been strained to its full stretch being slackened on purpose.

The collar vice is a strong iron hoop, [Fig : 10.] about 15 inches in diameter, 2 broad, and half an inch thick, closing at one side with a screw, and united by a hinge at the opposite : it is placed around the post and pressed against it just above and in contact with the wire which has already been strained. It is made to seize hold of this by the vice teeth and screw on the inside of the post, and the whole being made perfectly fast, the straining screw is slackened and removed. The end of the wire, now freed from the last named tool, is turned half round the post and tied in the same manner as was the original one. The uppermost wire is that which should be first secured, and then the second and third, and so on in succession : care should be taken that none of the wires are strained so hard as to slacken any of those which have been placed over them. There is no other limit to the extent to which they may be drawn.

Previously to working the straining screw a temporary spur might occasionally be slaced with advantage against the post from which the wire is strained ; this may be removed so soon as the fence has been carried on to the next straining post.

A wire fence carried on as far as possible in a straight line is much cheaper than are curved ones, because posts with spurs are only required at the extreme ends of the line. When an angle is to be turned, instead of having the corner post supplied with spurs on each side in the direction of the line of fence, a single spur, bisecting the angle, will, on the principle of the resolution of forces, serve for both. It would be well that this spur were slightly divided, so as to have a double tail, split about six inches, to bat into the stone in case of any irregularity of strain, or inaccuracy in placing it, so as to counteract the pull of the wires. [Fig : 11. *a* the post, *a c* and *a c* the lines of fence, *a b* and *a b* the spurs, *a d* the single spur bisecting the angle, which will serve instead of the two spurs *a b* and *a b*.]

If the lesser uprights be properly fitted with spurs, placed in the direction of the centre of the figure, the fence may be made to sweep round a circular plat, or take any other curve, however abrupt, that may be desired. Strictly speaking, indeed, it can in no case form a curve, but a polygon of any given number of sides, each of which to the extent of six feet at least is straight.

It must not be supposed from the length of this description that there is any thing in the least degree difficult or tedious in the construction of wire fences ; so much the contrary of this is the case, that a hundred yards may easily be finished of a morning after the uprights have all been properly set up. I have gone thus far minutely into details, giving an account of almost every possible difficulty that the beginner is likely to encounter, to enable him to have a fence set up with as little trouble as possible. It will be a long time before men regularly instructed in the art, simple though it be, can be looked for in India, wherever fences of this sort may be desired to be erected.

So far as my own experience extends, I should say the natives were remarkably easily taught the use of the tools, and speedily became very expert in handling them. I set up nearly 100 yards in the Observatory compound with wooden straining posts and bamboo uprights : and again in the case of the beautiful fence at the Agricultural Society's gardens—I went out and remained at the gardener's bungalow for some time, while this and one or two other novel operations were in progress, and found not the slightest difficulty in instructing the mallies, who

seemed anxious to learn, and greatly delighted when they attained proficiency. Of course it is in vain to hope to instruct natives who never saw a wire fence—and who when the various parts and different tools are laid before them, have not the most remote idea of the manner in which they are to be employed, or the ultimate object designed to be attained, by means of mere verbal directions. An European must put his hand to the work and first shew them what is to be done, and the result desired to be accomplished, and he will speedily find all difficulties vanish. On no account ought slovenly work be permitted to pass at the commencement: posts set negligently up—wire badly straightened, or a knot clumsily tied—these and all other imperfections which might accidentally pass unnoticed at the beginning—and which European workmen would afterwards learn to avoid, natives take as copies; and imitate on system the blunders committed by accident.

When the fence is completed, it should be well painted or pitched; at home they generally use coal tar; here I have found common dammer very suitable.

The ground underneath it all along ought now to be dressed and smoothed over—the stones being covered with earth—the uprights of all descriptions thus appearing to spring from the ground.

It is only necessary to put in a few extra wires at the bottom to make the fence a perfect protection against lambs, hares, rabbits, or any other animals desired to be excluded.

It is sufficiently strong to resist the charge of a horse, or the pressure of cattle,—both of which, however, speedily become very wary of coming against it from the disagreeable sensation it occasions when run upon; it resumes its former position the moment the shock is past or pressure removed*.

In ordering a wire fence to be prepared for any enclosure, the following information requires to be given b fore a satisfactory job can be expected: 1st, the purpose for which the fence is intended—such as a lawn or park, a pleasure-ground or garden-enclosure; 2d, the nature of the ground, whether hilly or level; 3d, the character of the fence, whether straight, curved, or angular,—and if either of the latter, the amount of the curvature or angularity. In truth, a ground plan of the enclosure drawn to a scale, and containing also a section of the more irregular portions of it, ought to be supplied. The number of gates, apertures, or breaks, and consequently the number of end pillars, and the height of the fence when finished. If these things be attended to with tolerable care, a fence can be constructed at home and sent out to India infinitely cheaper than any variety of wall or rail, whose erection here will be the simplest thing imaginable.

Mr. Young, of Perth, by whom the Agricultural Society has been supplied, has had more experience in this way than any man I am acquainted with, having, I believe, set up many hundreds of miles of fence: he has no agent in Bombay, but could at once supply fences on reference for payment being given, or remittance made. Messrs. Elsam & Co. seem the only parties here who have had much experience in this matter: they assure me of their willingness to supply every sort of information required, and to attend to any orders which may be given them.

The Society has two complete sets of tools, which are very willingly lent out; this saves the expense of purchase to those who only desire to have a small amount of fence set up. The tools cost about £2. 10s. a set.

In reference to the expense of the construction of a wire fence, it will be seen from the note of Sir Alexander Muir MacKenzie, that in Scotland it can be set up of the simplest sort for 6d. a yard; and by using jungle wood for straining posts, and bamboos for uprights, 80 yards cost me Rs. 25. or something less than a rupee for every three yards.

The following is Mr. Young's account for 400 yards of fence supplied to the Society, which cost in all £60, so that the expense of this amounted to about 3s. or Rs. 1½ per yard; this without including cost of freight, duty, or setting up. The reason of this apparently high rate of charge is that the fence is of very unusual height and strength; this being considered requisite from the extreme hilliness and irregularity of the ground for which it was intended—the Society

* Pamphlet on Wire Fences by [illegible] James Young, Ironmonger, Perth. There are no directions given in the pamphlet as to the manner of setting up wire-fences. Mr. Young is the person who supplied the Agri-Horticultural Society with its fences, and nothing could have been more perfect and complete than the manner in which they have been executed.

at the time it was ordered entertaining the hope that they might be permitted to enclose Parell-hill for the purposes of experimental Arboriculture. The fence is four and a half feet high, with nine wires. The bearing posts are only 60 yards apart, and the uprights were intended to have been no more than six feet asunder: they have been put up at a distance of eight feet from each other, and are found to be near enough.

Perth, 23d August, 1842.

The Agricultural and Horticultural Society
of Western India.

To James D. Young.

To 200 Strong Malleable Iron Standards, @ 2s. 2d.		£21 13 4
— 9 Strong do. Pillars, ... 18s.		8 2 0
— 2 do. do. Double Spurs, ... 13s. 8d.		1 7 4
To 630 lbs. Prepared Fencing Wire, No. 4, @ 3¼d.		8 10 7½
—630 ... do. do. No. 6.... 3¼d.		8 10 7½
—250 ... do, do. No. 8.... 3½d.		3 12 11
		£51 16 10
—Painting Standards and Pillars, one coat	£1 5 6	
—Strong Box for do. do.	1 12 6	
—Matting for 5 Bales Wire, ...	0 15 0	
—Roping 3s. 6d., Cartage 3s., Porterage 1s. 6d., Shore Dues 3s. 6d.	0 11 6	
—Pigs and Eye-blocks enclosed.	0 8 6	
—Paid Freight and Charges to Bombay, ...	4 16 6	
		£9 9 6
		£61 6 4

The freight and duty come to but a trifling sum. I cannot exactly speak of the cost of setting up the fence, as the work was chiefly done by the garden mallies, extra work-people having been required for the construction of a terrace of which the fence formed one edge. Nor would information on this point be of much avail to others, as the charges of erection must depend on the price of labour and facility with which stone can be obtained at the place where a fence is desired to be erected.

No greater improvement in the appearance of the bungalows at Poonah or Kirkee could be effected, than by the substitution of wire fences for the prickly pear hedges, which now everywhere deform them.

Were a line of wire fence with gates to correspond, substituted on the Bombay esplanade, for the present jagged and irregular bamboo trellis work, it might be permitted to remain all the year round, even after the temporary bungalows to which it belonged were removed. It would in no way obstruct the view of the artillerymen on the ramparts, in case of a hostile force effecting a landing in Back Bay—the apprehension of which has hitherto, I understand, prevented permanent structures of any sort from being permitted to remain there throughout the year: and in the event of the alarms for approach of danger from this source diminishing or dying away, the flowering creepers which are annually destroyed with the railings which support them, and which have barely attained maturity when they are required to be removed, might be permitted to remain with the wire fence all the year round.

There are in fact few military stations in India, the aspect of which would not be infinitely improved by the introduction of this species of enclosure. These observations may be concluded by the republication of a portion of a paper by me, which was read before the Highland Society of Scotland in 1842, on the construction of field gates in general,—the part about to be quoted describes wire gates only:—

"*Newly Constructed Wire-Gates.*—Having thus minutely directed attention to the various forms of field-gates now in use, it appeared to me, that, by the proper combination of iron-bars and wires, a much more economical, light, elegant, strong, and durable gate might be formed, than any of those now generally in use. The first point to which attention was directed was, that, in exposing the finer wires at all times to a pulling strain, the filling up of the gate should everywhere brace and strengthen the bars of the framing. The gate marked [Fig. 12.]

was the first designed with these ends in view. That marked [Fig : 13.] is the framing of fig. 2 devoid of its rays, and forms of itself an exceedingly light and efficient gate, though not perhaps quite adequate for keeping in lambs, or excluding hares, rabbits, or game.

"The framing *a b c d* fig. 13, is fashioned like that of an ordinary gate, the bar-iron being considerably lighter than in these ; *e f*, *g h* and *k l* are three light slips of iron parallel to the ends of the gate, and rivetted to the upper and lower rails ; *a p b* is a wire, about the thickness of a goose-quill, fastened by a rivet and counter-sink at one end, and a screw and nut at the other : it passes through holes in the slips *e f g h*, and *k l* and serves as a brace to support *a b*.

"In the same manner, *d p c* serves as a brace to *d c*, while the two sides of the gate being coupled together by the slips *e f*, *g h* and *k l*, the lower and upper rails have severally the benefit of both braces. The diagonals *a c* and *d b* keep the frame in shape, while *a s d* and *b t c* are braces to *a d* and *b c* ; *m n* is a light strap of iron, not required in the rayed gate, fig. 14. It will now be seen that all the wires and straps, which act as fills-up, are either braces or supports, so that nothing can be more stiff than the gate thus completed. It weighs about 80 lbs., and costs £1, 8s. Its dimensions are 9 feet by 3½, but may be made of any size, the price being altered in proportion. It will be observed, that a gate, with one bolt, when shut rapidly vibrates for some time at the fore-foot ; this is completely obviated by two bolts, coupled together, and acting simultaneously. This has the additional benefit of doubling the chances of the gate securing itself when shut. It is also convenient for gates opening into policy-grounds getting bolted when thrown back, by means of a short stump driven into the ground, with a catch just the height of the lower bolt.

"In the rayed gate, fig. 12, the framing, as already stated, is exactly the same as that just described—the hor'zontal strap *m n* and the brace *a s d* being omitted as superfluous. The rays consist of wires or rods the thickness of a goose quill, and about 9 inches from each other. Their lower extremities are driven up into nail-heads or rivets ; their upper ends are fastened with a nut and screw. For the accommodation of these, a strong iron arch is placed in the corner of the gate, and made fast at both ends by a nut and screw. Its range down the heel part, as compared with that along the upper rail, should be as the length of the gate is to its height ; that is, if the gate be 9 feet by 3, then the fastening of the arcs should be 18 inches down the heel part, and 6 along the upper rail. A gate of this sort, of the above dimensions, costs from £1, 15s. to £2, 5s.

"Not only are these eminently adapted for ordinary field enclosures, but more especially so for toll-bar gates and gentlemen's parks, or indeed wherever light gates of considerable span are required."

These gates are eminently suited for wire fences ; they sell at home at from £2 to £2 10, and in Bombay for Rs. 25 to Rs. 30. Fig. 14 is a somewhat more complicated arrangement of the wires on the same principles.

The carriage way of this gate is 11 feet, the wickets 2½ each. The whole space 17 feet. These gates cost £15 at home, and Rs. 180 at Bombay, where they are now to be seen in considerable numbers.

G. B.

Elements of Natural Philosophy, or a brief introduction to Mechanics, compiled for the use of schools. By E. B. Mendies. P. S. DeRozario & Co., Tank Square.

From the preface to the little volume presented to our notice under the above title we learn that it is intended for *children alone*, and owes its existence to the fact that the Books hitherto used are too difficult for the comprehension of young minds. In forming an estimate therefore of the merits of the production before us it becomes necessary to compare it with such works as it has been designed to supercede. The compiler of "The Elements" has not deemed it necessary to particularise the Books to which he alludes, and we are therefore left to select such as our own judgment may suggest, or on which the voice of

popular opinion has hitherto pronounced its most favourable dictum. Our shelves present a pretty fair proportion of the works of the most approved authors who have devoted their attention to the subjects of Natural Philosophy and Mechanics for young people; of those Pinnock, Comstock "Easy lessons in Mechanics," Chambers, Joyce, and "The Educator" may suffice, and we honestly avow our conviction that in a comparison with all or any of these the work before us must yield in the very qualities for which it is professedly sent forth.

It is not our object or desire to detract from the merits of Mr. Mendies' labour; on the contrary, we have much pleasure in recommending it to favourable notice, but not on the ground set forth in the preface. The work evinces industrious pains taking, and research; the expositions, indeed, which accompany the various statements of natural phenomena and serve to illustrate the application of the general principles of Mechanical science are not in every case either so accurate or so clear as they ought to have been rendered, but, even with these drawbacks, it may serve as a cheap Hand Book for 'children of a larger growth,' but is wanting in simplicity of language, of arrangement and style, to fit it for the minds of very young ones, and for such we conceive Mr. Mendies intended it.

Whilst on the subject of a Book for young people, we may observe that it has always appeared to us one of the most dangerous mistakes into which writers can fall who imagine it an easy matter to write for children. We verily believe that if there be one task more be-set with difficulties than any other,—requiring for its execution a deep insight of the workings and sinuosities of the human mind,—accurate and extensive knowledge—a ripened and unbiassed judgment, nice in its discriminations—an unyielding love of the truth, and with all these, a most rare and felicitous temperament of mind and feeling which can concentrate and direct these powers to one purpose or object—it is that of preparing the *elements of education.*

SELECTIONS FROM BRITISH AND OTHER PERIODICALS.

DESCRIPTION OF AN ENTIRELY NEW SUSPENSION BRIDGE, DESIGNED BY, AND ERECTED UNDER THE SUPERINTENDENCE OF, THOMAS MOTLEY, CIVIL ENGINEER, BRISTOL.

The bridge of which [Plate 19] is a representation was erected in 1837, over the river Avon, at Tiverton, near Bath, and is the first of the kind ever constructed. The span of the middle compartment is 120 feet, from centre to centre of the pyramids, the land ends are about 55 feet each, making the whole length of the bridge 230 feet. The road way is 14 feet wide between the suspending bars. The four pyramids are placed each pair on a concrete foundation, 12 feet by 22 feet, 16 feet deep on one side and 9 feet on the other side; the concrete rests on a firm stratum of clay. The pyramids are each composed of six courses of Bath stone, 2 feet 6 inches deep, containing two blocks in each course. Their dimensions are—base, 5 feet 6 inches by 4 feet 6 inches; top, 3 feet by 2 feet 6 inches. They are covered with a capping, as shown in the drawing. At the base of each pyramid, level with the lower part of the beam of the bridge, is a large cast-iron bed, secured by holding-down bolts inserted into other cast-iron plates in the foundation. In the centre of the large plate is inserted an iron bar, 3 inches by 1 inch, which passes up the centre of the pyramid to a cast-iron plate at the top, to which it is firmly secured. The suspending bars are 2 feet 6 inches apart, and the space between their points of attachment to the bridge about 9 feet 3 inches.

The substance of these bars averages full 2 inches by 1 inch; they are welded in entire lengths, and connected on each side of the pyramid by two bars, 3 inches by half an inch, passing through the pyramid, bent in the direction of the strain, and fastened to the suspending bars by gibs and keys. On each side of the pyramid is inserted a cast-iron plate, from the base to the top suspending bar, cast with holes, through which these connecting bars pass.

The beam is composed of two bars of wrought-iron, 7 inches wide by $\frac{5}{8}$ thick, in lengths of about 18 feet, each properly arranged so as to break the joints, and are connected by brace plates. At the edge of each suspending bar which connects with the beam of the bridge is welded an upright piece of iron, about a foot long, of the same substance as the upright supports, $1\frac{3}{4}$ by 1 inch, and to this the upright supports are attached by coupling joints. In the uprights are made proper eyes, through which the suspending bars pass, and are made tight by a wedge in the eyes above and below the bar, and covered over with a cast-iron rosette. Each suspending bar is attached to a round iron bolt, 2 inches diameter, which passes transversely to connect the two ribs, or beams. At the land abutment the rib, or beam, is secured to cast-iron chairs, held down by strong iron bolts, and firmly secured to cast-iron plates, inserted in the foundation. The diagonal railing on each side of the bridge is filled in with upright round bars of iron, 1 inch diameter, about 6 inches apart—which are omitted in the drawing, to prevent a confusing of lines. The weight of wrought-iron in the suspending and upright bars is about 7 tons; the whole weight of wrought-iron, including transverse bolts, beams, (or ribs), foundation plate, bolts, railing, &c., about 18 tons; and of cast-iron about 5 tons. The floor is composed of Memel joists and oak platform. The joists are 12 inches deep by $3\frac{1}{2}$ inches thick, bevelled off on the top from the centre to 10 inches at the ends; the flooring boards are about 9 inches wide and $2\frac{1}{2}$ inches thick, and are covered with a thick coating of coal-tar and sand, on which is laid screened gravel, of an average thickness, in a convex form, to allow the water to run to the sides of the bridge.

The following was the mode of construction adopted:—The land ends of the bridge were first erected; the middle portion, over the towing path and river, was constructed by means of a platfrom, or hanging scaffold, suspended horizontally, by means of ropes and pulleys, from the top of the pyramid. This platform was chained to the iron work, as it extended out, so that the bridge was carried over the river without any support from beneath.

The foregoing description will, it is presumed, be sufficient to enable those who are acquainted practically with iron to form a tolerable idea of the principles on which the bridge is built, and its effect. It may, however, be observed, that the principle is that of the inverted bracket, converting the force of compression into that of tension, and at the same time preserving as much compression as circumstances will permit, or as may be deemed requisite. It must be evident to the most superficial observer that this mode of construction and arrangement must be less flexible than a chain, and practice has proved that for stability it is unquestionably superior to suspensions with curved chains, and, therefore, will rank next to cast-iron. Loads of timber, of from six to eight tons, have passed over this bridge without producing any visible change in the floor; indeed, none can be made without either breaking or elongating the bars, except so far as the natural elasticity of wrought iron will allow. The power of the above bridge may be nearly ascertained by treating it as a lever, which is unquestionably, the law by which all bridges are governed. Thus the first suspending bar descends to the bridge at 2 feet 6 inches from the base of the pyramid, and extends on the floor nearly 10 feet, which is four times the height, and consequently one ton at the end would produce a strain of four tons at the pyramid, and so on in like proportion with each of the upper bars. Now there are 24 suspending bars, averaging a section of full 2 inches to each bar, which make 48 inches; then, supposing one inch of best cable iron to bear a strain of 20 tons previous to separating (though it would begin to stretch with half that strain), 48 inches would support a direct or perpendicular strain of 960 tons; but the average being 4 to 1, they would only support a uniform load of 240 tons, the weight of the materials included. Thus, if the proportion of the material were increased, say 50 per cent., it is presumed that this kind of bridge would be well adapted for railway purposes, even with such

ponderous engines as are used on the Great Western Railway.

The cost of the above bridge, including the expense of masonry and very deep foundations, exclusive of embankments and approaches, was under 2500*l.*, and was erected within 5 per cent. of the estimate. Provided only that it be duly painted it is presumed that the iron work will endure even for centuries without requiring repairs of any consequence, as may be fairly expected, from its inflexible nature, and the almost entire absence of friction. It may be further observed that the joists, which are about 21 inches apart, the end projecting 9 inches, are notched about 2 inches down on the double iron beam, to which projection they are securely fixed by iron bolts with cross heads, so as to clip the lower edge of the beam, thus performing the office of cramps; and the boards being well laid, longitudinally, produce all the effects of horizontal diagonal bracing, and, therefore, no diagonal bracing is used, and hence the absence of an oscillating motion.

(COPY.)

Newark Iron-Works,
Bath, March 22.

DEAR SIR,—In reply to your request as to my opinion of the present state of the Tiverton-bridge, which I assisted in the erection of, about six years ago, I beg to state (with the exception of an immaterial effect, produced by a slight sinking of the masonry on one side), it is as perfect and sound as when first erected, and, I have no doubt, will continue to be so for very many years, without requiring any repair, except occasionally painting. As regards my opinion, generally, of the principle of construction, I have no hesitation in stating (that, under general circumstances), it is equally strong as the best proportioned Suspension-bridge with curved chains, *and vastly superior to them in stiffness, and the absence of all undulation, every part being supported by direct tension.* It has also this great advantage, that the giving way, or removing, any one of the tension bars would not endanger the rest—any one of them being removable at pleasure.

I remain, your's, truly,

Mr. Motley. GEO. RAYNO.

[*Mining Journal.*

ON ARTESIAN WELLS. BY M. MULOT.

The globe which we inhabit is manifestly a focus of action and heat, which has its greatest energy at the centre of the mass, and which, from this central point, works incessantly to carry matter from the interior to every point of the surface, and which, in this constant effort, meets with a gradually increasing resistance from the successive strata composing the crust of the earth.

This exterior resistance constrains the central fire to divide and attenuate the matter of the interior, and to sift it, as it were, in minute particles through the pores of the general envelope.

From this internal elaboration, and this subtile oozing out, arises the continual emission of interior caloric, an emission which necessarily takes place in a radiating form; that is to say, each jet or stream of caloric escapes and flies off in a direction perpendicular to the surface. Here then is the first analogy with the vertical stream of water which issues from an Artesian well. Each pore in the terrestrial covering is an Artesian well of caloric; and so again is each pore in the surface of every star in heaven an Artesian well of light. These Artesian pores in the crust of the earth being infinitely numerous, it is through these that the central fire impels, in a state of the most minute subdivision, a great part of its interior contents.

This way of escape, however, is not every where sufficient, the central action does not appear to succeed in attenuating every substance to such a degree as to effect its expulsion through such exquisitely minute apertures. At many places under the terrestrial covering, opposing masses are crowded together, some in a state of gas, others in a vapoury state, others again in a liquid form, and others possessing the consistency of solids, but all the same time broken and confusedly mixed together; and all these substances, whether gases, vapours, liquids, or solids, are agitated by a movement whose impetuosity equals its disorder.

The time is now come when the exterior resistance is suddenly conquered; the crust cracks—a volcano is open, and its centre shoots forth immense jets; at first of gas and vapour, then of liquid water, then of burning lava. It is a frightful pit, suddenly thrown out by the irritation of the central fire.

We know that the volcanoes of Iceland frequently vomit forth torrents of gas, vapour, and liquid water, which cannot have come from the sea, as its composition is different from that of sea water.

Let us imagine, for a moment, what

would happen if at the instant when a volcano was about to burst forth, its crater could be contracted into a straight tube like that of Grenelle! What a magnificent Artesian well would then be displayed! What force and height would there be in the jet sent forth.

But let us not forget that every volcano is a kind of relief and vent for the interior tumult of the earth. It resembles the pimples and boils on the skins of men and animals. In the normal or regular state, the volcano is silent, and so in a state of health is our skin smooth and sound.

Thus, at the present time, when no terrestrial volcano is in a state of formidable eruption, the globe, like a sound and healthy man, quietly and uniformly transpires through every microscopic opening in its surface, the superabundance of its interior productions; and under their general covering these productions are chemically elaborated, so that each may occupy its proper region. The water in a state of vapour, which is directly formed in the bowels of the earth, even finds a passage through strata of the denser character. If near the surface it meets with argillaceous masses, it requires an increase of effort to traverse them. Below these the vapour thickens, condenses, and takes at length the liquid form; and then, far from being oppressed by the contact and weight of the solid masses which cover it, the water is constantly, if we may use the expression, in a state of insurrection against them, and continually seeking to rush up through them, or throw them off.

Hence it is that if human industry, exerting itself at the surface of the earth, shall pierce this surface and force down a vertical pipe into the aqueous region, the impatient water seizes upon the means of escape, and fully liquified by its very first movement in a passage so contracted, runs impetuously through its whole length. Arrived at the orifice, it flows over, and even mounts above it. The vertical jet has a force proportionate to the depth of the excavation which was necessary to arrive at the water.

This circumstance is remarkable, for the contrary would be the case if the Artesian fountain were produced like an ordinary *jet d'eau*, by the simple weight of a liquid column falling from an elevated reservoir, and working to regain its level. We know that in every hydraulic apparatus, the effective action is weakened in proportion to the extent of surface which the liquid has to pass over, and to the friction it has to overcome.

But not only is the force of the Artesian jet much greater in proportion to the depth of the excavation—the heat of the liquid itself shows clearly that the augur of the well-sinker has more closely approached the producing and expelling fire which exists in the centre of the globe.

The source then of Artesian eruptions, is the same as that of volcanic eruptions; it is the central action of this terrestrial globe; it is the formidable power, which, during the infancy of the world, launched out upon its primitive surface alike the isolated cones and long unbroken chains of lofty mountains, and which from time to time is exerting efforts to raise new mountains. This marvellous power is that sole and universal force, that expansion which is constantly in exercise throughout all material being; it is none other than the grand principle, the soul of nature, the producer of life, which under the eyes of all men, spreads and developes itself throughout the substance of every organized being, and whose expression and sentiment each one of us exhibits in his own person.—*Polytechnic Journal.*

ETHER ENGINE.

To the Editor of the Mining Journal.

Sir,—Many years ago I proposed a small vapour of ether engine, which, though limited in action, I cannot but believe might be made subservient to many useful purposes. I published a figure of this simple machine in one of my chemical works, which may be thus described:—It consists of a globe, with a ball branching from it; when this globe, containing sulphuric ether, dips into a vessel supplied with water, at a temperature exceeding 100° Fahrenheit, the ether assumes the elastic form, and impels a double-headed piston to the further terminus of the horizontal cylinder connected with it, which, as the cylinder is equipoised, when the piston is central (being suspended like the balance on a fulcrum), will then preponderate in that direction. This elevation of the branching ball, also charged with ethereal vapour, coming in contact with a plug above, discharges a jet of cold water, which, condensing the vapour, the piston is propelled in the contrary direction, in virtue of atmospheric

pressure, towards the newly-formed vacuum. The globe again dips into the hot water, and the piston is again, like a shuttle, propelled to the other extremity, and so on. Checks in the horizontal cylinder regulate the extent of the piston's range. Thus is the balance alternately elevated and depressed at either end, and serves, at the extremity furthest removed from the globe, to act on the piston-rod of a water pump; it is clear there can be no waste of ether. An officer of her Majesty's ship *Britannia*, 120 guns, told me it would be invaluable on ship-board, in storms, to work the pumps. I am surprised that ether, conjoined with the electric spark, has not long ago been employed in gunnery, as a propelling power of gigantic force, when it is considered with what impetus a ball is discharged from a model mortar, by the sudden expansion of a drop of ether, effected by the electric spark. It occurs to me that Smee's battery might be admirably applied in the ignition of platinum wire confined in a cylinder to expand ether, or reduce it to a highly elastic vapour, together with other elastic fluids and media, and produce prime movers of immense power, by the most simple means. The mode of condensation is sufficiently obvious. J. MURRAY.

NEW MOTIVE POWER—THE CARBONIC ACID ENGINE.

Great as have been the results of the discovery of Watt, and the subsequent improvements on the steam engine, the advantages obtained by commerce and the arts from this gigantic power are purchased at a great expense—principally in the consumption of fuel; on the Great Western line, the item of "coke" alone amounting to 1000*l*, per week. From the simple known fact of heat increasing the volume of any of the elastic gases to a great extent, and giving, in that expansion, an enormous pressure, many attempts have been made to take advantage of this law of nature, to establish a power far exceeding that of steam, and obtainable at a mere trifling expense. Dr. Faraday, by a long course of experiments on the liquifaction of gases, obtained a most important and detailed knowledge of their various properties, powers of expansibility, and the pressure exerted under different degrees of heat; and it is upon the properties of carbonic acid and ammoniacal gases that the principle of this new motive power (invented by Isham Baggs, Esq., of Cheltenham) is based. Carbonic acid is an invisible elastic fluid, half as heavy again as atmospheric air (100 cubic inches weighing forty-seven grains and a fraction), expands by heat, and can be liquified by continuing the generation in close and strong vessels, at a temperature of 32° Fahrenheit, until the pressure of its own atmosphere accomplishes it. Twenty volumes at this temperature occupy twenty-nine volumes at 86°, and exert a power equal to 1095 lbs. per square inch: and the liquid acid, in expanding to gas, increases its volume 443 times. The mechanical properties of the ammoniacal gas are closely allied to those of carbonic acid gas, and, in undergoing a similar change, it occupies about 1040 times its original bulk. When one volume of carbonic acid gas is mixed with two volumes of ammoniacal gas, both lose their elastic properties, and become a white solid (carbonate of ammonia); if water be present, they will condense in equal volumes. By the separation of a volatile base by a fixed acid a definite salt is obtained, which, on exposure to heat, gives off the volatile gas, and leaves the acid behind; thus a continual decomposition and re-combination goes on, giving out an immense power, and without any loss of material—the products always being the exact chemical amount used at the commencement of the process. Upon this principle Mr. Baggs's invention is based; and we hope, in a future number, to be enabled to give an accurate and clear description of the mechanical arrangement of the engine for bringing this power into practical use.—*Mining Journal.*

SMEE'S CHEMICO-MECHANICAL BATTERY.

The Gold Isis Medal was presented to Mr. Alfred Smee, Surgeon, Bank of England, by the Society of Arts, &c. for the following communication on a Galvanic Battery of a new construction a Model of which has been placed in the Society's Repository.

The most valuable instrument which chemists employ for their analytical experiments is, no doubt, the galvanic battery; but so much trouble attends its use that, except in the laboratory of the professed chemist, it is not employed to any considerable extent. Experiencing this inconvenience in the experiments which I conducted on the red ferrocyanate of potash, it became a matter of the greatest importance to ascertain how far a battery could

constructed, that at once should possess a capability of being used at a moment's notice, and have besides considerable power united with cheapness of action, and, at the same time, without the necessity of much laborious cleaning after its employment.

After experimenting with the batteries before known to the public, I became convinced that it was of the highest importance to supersede the necessity of diaphragms, attended as they are with continual trouble and expense; and as the power of the battery seems to depend upon the facility offered to the evolution of the hydrogen, and preventing its adhesion to the negative metal, whereby it is coated as with a varnish, and the action almost entirely destroyed, all my experiments were directed to this object. I first perceived that the gas was not evolved equally from every part of the surface of a smooth piece of platinum, but chiefly from the corners, edges, and points. Following this hint, I roughened the metal with sand-paper, and found the evolution of the gas to be increased; and when the surface of other metals, as silver or iron, was roughened by some acid, I found the gas also to be much increased. Moreover, zinc shavings, which present the singular anomaly of having one surface extremely bright and the other of a delicate frosted appearance, show this property well, gas being freely given off from the rough, but adhering firmly to the bright surface. The same differences are also observed when rough and polished steel are employed. These experiments induced the idea that spongy platinum, which may be considered as a mass of metallic points, would be very efficient in forming a galvanic circuit; and on trying the experiment, the quantity of hydrogen evolved from a minute portion of this substance, when touched with a piece of zinc, was truly astonishing. The mass in this state was so fragile, that the hydrogen disintegrated it almost instantaneously, showing that in this form it could not be used for a voltaic battery.

My next experiments were to coat other metals with this finely-divided platinum; and I found that platinum, palladium, or silver, answered admirably for the reception of it, and similar help was afforded to the evolution of the hydrogen, as the contrast between the gas given off from the smooth metal and rough metal forms a most striking experiment. Other metals received the platinum with advantage; as plated copper or iron, and even charcoal, was benefited to a similar extent*.

The metals thus roughened by platinum have, in addition to their power, some properties which are very interesting; thus, when a piece of the prepared metal is placed in dilute sulphuric acid and touched with a small rod of zinc, gas is not given off from its whole extent, but only from the space of a small circle; and when contact is completed with a smooth piece of platinum, the gas will not be given off from the latter, but will travel principally to the rough portion, there to be evolved. This curious experiment affords a marked difference from those cases where the hydrogen is absorbed, as when a piece of silver is touched with a rod of zinc in dilute sulphate of copper, for in this case an immense circle of copper will be thrown down.

A difficulty now arose in this stage of the proceeding, for the finely divided platinum was so easily rubbed off that it could not be practically used with advantage. However, when the silver or other metal was first roughened by the removal of the surface by an acid, then the adhesion was so great that a piece of platinum thus prepared was sent accidentally to the instrument maker, where the workman mistook the finely divided platinum for dirt, and could only remove it with sand-paper.

It now became desirable to ascertain the power of the metal thus prepared relatively with the other batteries, and also with metals uncovered with the finely-divided platinum; and to make this comparison, I perceived that considerable difficulty occurred, for as this preparation of the metals increases the quantity, but does not interfere with the intensity, a fair comparison cannot be made where there is any impediment or difficulty to be overcome, unless that difficulty be superseded by increasing the number of cells of the battery; and therefore, had I at first taken the decomposition of water, as the test for my numerous experiments, they would have been attended with an immense expense; had I taken the heating of wire as my test, that would also have been uncertain, according as the heating of large or small wires was estimated; but I considered that a close relative estimate of power could be ascertained by the magnetical effect; for, by using

* Charcoal and plumbago might be considered to afford points enough for the escape of the hydrogen, but to these there is great adhesion of the gas.

large wires round the temporary magnet, but little impediment was offered to the current, and thus the quantity, independent of the intensity, could be accurately ascertained; and in repeating my experiments, at different times, on the same magnet and with the same surface of like metals, I found that they coincided with remarkable accuracy, and only one cell was required for the experiment. Though the weight which was supported even by a small magnet with large wires, was inconveniently great, I determined to ascertain the distance at which a small but lesser weight was attracted.

The following are the results of like surface of metal with the same metal :—

	Layers of paper.
Smooth silver, supported keeper through	2
Smooth copper	1
Silver heated, quenched in acid	9
" surface removed by nitric acid	9
Iron rough	8
Daniell's battery	6
Platinised silver	20
" iron, two or three varieties	20
" platinum	18
Groves's battery	26
" platinised platinum	30
Plain platinum heated, quenched in acid	12

By these experiments we see the great advantage of the rough metals and those covered with platinum over the smooth metals and Daniell's arrangement.

The only metal which may take the place of finely-divided platinum is palladium, but probably rhodium, iridium, and osmium, would have the same property, as they are precipitated in a fine black powder by zinc. The cause of this black colour is not at all evident; and the form of the black deposit has eluded not only my own but the observation of others, although aided by the microscope. Probably however, the colour is owing to the particles being too small to reflect the light, as is said to be the case with a specimen of quartz in the cabinet of the Duchess of Gordon, but this is merely hypothetical.

We have now seen that platinum, palladium, silver, plated copper, or iron are suitable for the finely-divided metal, and these are to be first roughened, the two former with sand paper and the three latter with a little nitric acid, which is to be again cleaned off by washing. The metals are then to be placed in any convenient vessel with a little dilute sulphuric acid, to which a small quantity of nitro-muriate of platinum has been added; a porous tube or paper bag, containing a piece of zinc, with more dilute sulphuric acid, is also to be placed in the vessel, when, as soon as the circuit is completed, the platinum is precipitated on the metal placed for its reception. The cost of this process will be best understood by mentioning that the assayers sell one ounce of the prepared silver for one shilling above the price which is charged for the silver alone.

The zinc which is used for the battery should be the best thick rolled zinc, as this is far preferable to the cast zinc, and it is to be amalgamated with mercury aided by dilute sulphuric acid: for the application of this process to the zinc of my battery will be found, unlike other batteries, not to require repeating.

The form which is most suitable for the battery appears to me a matter of fancy rather than of importance,—one circumstance alone being requisite; that is, if we are desirous of obtaining the greatest power with the utmost economy of silver, it is requisite that every portion of silver should be opposed to a piece of zinc, but the size of the latter, within moderate limits, is but of little consequence*. Thus, if we use the many-celled porcelain trough, it is better to surround the silver by zinc in the same way as the copper surrounds the zinc in the old Woollaston battery. If the circular form be adopted, a piece of zinc should be placed in the interior as well as the exterior of the cylinder, as by that means both surfaces of the silver are brought into action; if the Cruikshanks be adopted, one surface is necessarily lost, but in this case plated copper answers sufficiently well, as the edges are sunk into the cement, which, if exposed as in the other forms, are apt to have a portion of the copper dissolved, which is again deposited on the silver, and is liable to become oxydised and be detrimental to the power of the battery. The closer the zinc can conveniently be brought to the other metal the more favourable will it be.

* It is of great disadvantage to employ the zinc too small, as a simple rod to a large cylinder of silver. A certain quantity of zinc seems absolutely necessary to elicit the full power of this arrangement.

Whichsoever form is adopted, the power will depend on the series and size of the plates. For decomposition of water, and most other purposes, it is better to have twelve pairs of plates, and then to increase their size. The battery having twelve five-inch plates, which was exhibited to the Committee of the Society of Arts, gave off fifteen cubic inches of mixed gas in the first minute, and showed great calorific power by immediately burning stout steel music wire.

The duration of the action of the battery will depend, like a fire, upon the quantity of fuel supplied to it in the first instance, for, as there is no local action, it follows that the solution of the zinc will be exactly proportionate to the power produced; and for this reason, when the battery is required to continue in operation for a long period, as in the method which I detailed elsewhere for the production of electrotypes, a larger receptacle for acid should be employed, or a contrivance can easily be adopted to carry off gradually, by means of syphon tubes, the saturated solution of sulphate of zinc, whilst at the same time dilute acid is supplied from another tube.

A galvanic battery thus constructed owes its increase of power to the mechanical evolution of the gas, and as the experiments of Faraday have shown that the source of power in any voltaic pile is chemical action, I have ventured to call my form of apparatus the 'Chemico-Mechanical Battery.'

To those versed in mechanical science it may be needless to mention, that this form of battery simply increasing the quantity of electricity, it is most important that large communications and large wires should be used in its construction, or else the whole of the additional power might be lost*.

The advantages of the Chemico-Mechanical Battery, are, the cheapness in its employment, and its requiring not only less manipulation than any other battery, but also less cleaning. It can be put into action at a moment's notice, and, after having been used, can be as easily laid by. When in the fluid it will be quiet till communications are made, and will then possess considerable power. It neither gives off poisonous fumes, nor requires the aid of strong acids, and but one fluid is employed; and, lastly, the amalgamation of the zinc does not require to be renewed. Such are the principal advantages of this battery, and they appear to be sufficient to entitle it to the very extensive application which it has met with; but, in conclusion, I wish to be clearly understood that it does not possess the absolute constancy of Daniell's or the intensity of Grove's battery.

[*Polytechnic Jour*:

* This I have actually known to be the case; the power of the battery being almost destroyed by the use of small wires and small connexions.

HEAT AND LIGHT.

The *Emancipation* of Brussels announces that the directors of the Belgian railroads have made a discovery, and proved it by trial on the southern line, whereby the consumption of fuel may be reduced by 50 per cent. It is said to consist in improvements of the drawers of the engine, and in the steam-pipe. The *Presse* mentions that a trial of a mode of lighting by means of the new voltaic pile is about to be made on the Boulevards. It is said that the light is ten times more brilliant than that of gas.—*Mining Jour.*

NEW PYROMETER.

The model of the pyrometer consists of two discs, set in a frame, one of copper and the other of cast-iron, with a graduated index close to the rim of the copper disc. The discs revolve in the same plane, edge to edge, and by contact. At the temperature of 32° Fahrenheit, they are of the same size, ten inches circumference. At temperatures above and below 32°. the discs do not agree in size, owing to the unequal relative expansion of copper and iron by heat and cold. Copper being more affected by changes of temperature than iron, it follows that at temperatures below 32°, the iron disc is the larger, and at temperatures above 32°, the copper disc is in excess. The increase by heat in the length of the circumference of the copper disc beyond that of the iron one, is, however, so very small, that a line drawn across the edges of each, at the points of contact, may, after one revolution, seem again to coincide, but, by a sufficient number of revolutions, the discrepancy, arising from the superior expansion of the copper, may be multiplied so as to amount to the tenth part of an inch; thus, if the dilitation of the copper by 180° Fahrenheit

lengthens its circumference beyond that of the iron, the hundredth part of an inch (which is nearly the amount) then ten revolutions will give one-tenth of an inch. The excess of expansion acquired by the copper will be according to the intensity of heat; and the number of revolutions required to place the two lines that coincided on the edges of the discs before they were revolved, at the distance of, say, the tenth of an inch from one another, will be the measure of the excess of expansion and of the temperature. The chief apparent advantage that this instrument offers is facility to multiply the very small difference that results from the expansions of two different metals and other substances. It will be seen that forty revolutions of the wheels, having circumferences of only ten inches, give a difference equal to that of the linear expansions of two rods of the same metals, each 400 inches, or 33ft. 8in. in length. This model appears to be sufficiently sensitive, and to give tolerably accurate indications of temperature, so far as it can be compared with a mercurial thermometer. The materials of which it is composed are not, of course, suitable for the measurement of very high temperatures; but, if the principle should otherwise seem feasible, the inventor proposes to substitute more refractory substances, such as black-lead ware, Nankin procelain, &c. By employing discs of the same metal, but of different sizes, so that, the circumference of the one shall be equal to the diameter of the other, a mechanical approximation may be made to the ratio which the diameter of a circle bears to its circumference. The diameter and circumference of a circle being incommensurable, lines drawn across the rims of these discs, at the points of contact, will never meet by any number of revolutions; but the approximation of Archimedes will be exhibited after seven revolutions of the larger disc, and twenty-two of the smaller, and the still closer approximations of 106 to 333, and 113 to 335.—*Ibid.*

GOLD MINES OF SIBERIA.

Whilst the produce of the gold mines and the gold washings of Colombia. Brazil, and Spanish America generally has been for many years past and still continues on the decline—so much so, indeed, that in most instances, the yield of the works no longer suffices to cover the cost of the capital and labour employed in the extraction, it is an interesting fact in the economical, still more than in the geological, sense, to remark, on the contrary, the extraordinary development and progress of gold mining industry in Siberia. The auriferous riches of that polar province of the Russian empire were matter of little more than conjecture until within the last fifteen years, and when attention was roused to the probable fact by chance discoveries of gold, the results of the first experiments of enterprising individuals did not by any means correspond to the expectations excited among adventurers, or appear to countenance the belief in the treasures with which the soil was said to be impregnated. The speculative spirit and thirst for gain, however, once aroused, was not readily to be discouraged by individual and repeated failures—failures resulting, in many instances, in the loss of capital, the waste of labour, and the ruin of speculators. Unwearied and unremitting toil and explorations were gradually rewarded with greater success, until at length the produce of gold registered from the works and washings of the auriferous sands of Siberia has become of prodigious and yearly increasing amount, as will be seen by the following return, embracing the last thirteen years:—

Years.	Poods.	Lbs.	Zolotniks.
1830	5	32	$50\frac{1}{2}$
1831	10	18	$35\frac{1}{3}$
1832	21	34	$68\frac{3}{4}$
1833	36	32	$53\frac{1}{4}$
1834	65	18	$90\frac{3}{8}$
1835	93	12	$46\frac{1}{4}$
1836	105	9	41
1837	132	39	$5\frac{1}{2}$
1838	193	6	$47\frac{1}{3}$
1839	183	8	$16\frac{1}{8}$
1840	255	27	$26\frac{3}{8}$
1841	358	33	$14\frac{3}{4}$
1842	631	5	$21\frac{1}{1}$
Total	2093	38	46

The Russian pood is equal to 36 lbs. 1 oz. 11 drs. avoirdupois; 40 Russian pounds go to the pood, and 96 zolotniks to the pound. Taking the yield for 1842, and calculating the pood at 36 lbs. in round numbers, the quantity in English weight, would be 22,716 lbs. avoidupois—say 3l. 17s. 9d. per ounce as rendered into Troy weight would represent the value in round numbers of 1,156,000*l*. sterling.—*Ibid.*

Days.	Moon's Changes.	Self registering Thermometer. Minimum.	Thermometer, in the shade.					Daily range of Thermometer.	Difference between wet and dry bulb Thermometer.		Winds.		Remarks.		
			Sunrise.	9 A. M.	Noon.	3 P. M.	9 P. M.		9 A. M.	3 P. M.	A. M.	P. M.	Night.	A. M.	P. M
1		76.7	77	84·8	88·4	90·5	87	13·8	8	18·5	N.E.	W.N.W.	Fine.	Clear and fine.	Clear and
2		77	77	85·5	88·6	90·5	84	13·5	8·5	23	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
3		79	79	86	89·3	93·7	87	14·7	9·5	22·5	E.S.E.	N.E.strong.	Ditto.	Ditto.	Ditto.
4		74·3	74·5	82	86·9	88·7	85·5	14·4	9	16	E. strong.	N.E.	Ditto.	Ditto.	Ditto.
5		77·3	77·7	84·6	89·5	90·7	86·2	13·4	7·5	13	Ditto.	Ditto strong.	Ditto.	Ditto.	Ditto.
6		77·4	77·9	82·6	89	90·2	79·7	12·8	7·5	14·5	Ditto.	N.E. squally.	Ditto.	Ditto.	Cloudy.
7	☽	73	73·7	82	86	89·5	84·4	16·5	8.5	14·5	Ditto.	Northerly.	Ditto.	Ditto.	Clear and f
8		77	77·7	83	89	91	100	23	7	17	Ditto.	Westerly.	Ditto.	Light Clouds.	Ditto. 8.9 s
9		74	74	82·5	84·3	86·1	—	12·1	9	14	E.	N. light.	Sqly. & rain.	Cloudy.	Ditto.
10		69	71	81	83·3	85·1	80	16·1	7	14	N.E. light.	N.E. light.	Fine.	Light Clouds.	Thunder
11		73·2	73·5	81·6	84·4	87	82	13·8	10	14·7	Ditto.	N.E.	Ditto.	Cloudy.	Light clou
12		73	73·5	81	85·4	88·4	83·4	15·4	8	13·5	E.	Ditto.	Ditto.	Light Clouds.	Ditto.
13		75·4	75·5	82·1	87	89·3	86	13·9	7.5	15	E. strong.	Ditto.	Ditto.	Clear and fine.	Thunder s
14		74·6	75·2	83	87·4	87·7	86·7	13·1	6·5	13·5	Ditto.	Ditto.	Rain.	Ditto.	Clear and f
15	○	78·7	78·7	84·8	89·5	90·5	89·5	11·8	10	16	N.E. strong	Ditto.	Fine.	Ditto.	Ditto.
16		80·5	80·9	88·3	90·9	86	79·5	10·4	8	10·5	E. strong.	N. squally.	Ditto.	Ditto.	Thunder s
17		75·4	76	84·3	87·5	88·1	86·4	12·7	6·5	17	N.E. light.	N.E. light.	Ditto.	Light Clouds.	Light Clou
18		75·5	76	86·1	88·9	91·3	87·1	15·8	11	18·5	W.N.W. light	W.N.W. light.	Ditto.	Ditto	Ditto.
19		79·9	80·7	87·5	89	88·9	82·5	9·1	14	15·5	Ditto.	Ditto.	Ditto.	Cloudy.	Dark and
20		78·3	78·6	88.5	91·8	92·8	88	14·5	13.5	21	E. light.	Ditto.	Ditto.	Ditto.	Light clou
21	☾	79·3	80·2	88·6	91.8	93	92·5	13·7	14	21	N.E.	Ditto.	Ditto.	Clear and fine.	Ditto.
22		82	82·2	88·8	93·2	89·5	87·6	11·2	10	16	E. strong.	E.	Ditto.	Ditto	Thudr. stor
23		83	83	84	87·9	89·5	81	6·5	8·5	11	Ditto.	Ditto.	Ditto.	Dark & Cloudy.	Dark cloud
24		77·4	78	81·4	85·6	85	81	8·2	3·5	4·5	Ditto.	E. strong.	Lt. rain.	Ditto.	Frequent s
25		77·1	78·7	83·8	85·2	86·3	81·5	9·2	3·5	7·5	E.S.E.	Ditto.	Rain.	Cloudy.	Ditto.
26		78·3	78·7	84·5	87	88·4	88	10·1	4·5	10	N. light.	W. light.	Fine.	Light Clouds.	Cloudy.
27		78·9	79·7	86·7	88·7	88·7	90	11·1	5	8·5	S.W.	Ditto.	Thdr storm &rain.	Ditto	Cloudy.
28	●	81·2	[illegible]	89·6	92·3	92·5	91	11·3	13	19	W.N.W. light.	N.N.W.	Fine.	Clear and fine.	Clear and f
29		82·4	82·4	88·4	91·5	94·2	88·7	11·8	13	20	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
30		80·2	80·5	85·3	90·8	93	86·7	12·8	5·5	21	E. strong.	N.E. strong.	Ditto.	Cloudy.	Light cloud
31		78·9	79·4	82·7	85·4	88·1	85·2	9·2	5	9·5	Ditto.	E.	Ditto.	Cloudy.	Cloudy.
Mean		77·6	77·8	85	88·3	89·4	86·2	12·7	8.5	15·1					

The Revd
Wm Morton

THE

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BIOGRAPHICAL SKETCHES.

The Rev. William Morton.

(WITH PORTRAIT.)

Were the space dedicated to this portion of our Journal less circumscribed than it is, we know not any purpose to which we should with greater pleasure devote it than that of registering the brief and unobtrusive memorials of those who have consecrated their lives, their talents, and their energies to the cause of Religion and to the spread of the Gospel in a heathen land; who, having abandoned the peace and comfort of their native homes, encounter the trials and duties of Missionary labour in a tropical climate.

Whilst the Statesman, the Soldier, the Philosopher and the Poet are alike remembered and honoured in the page of history, it cannot be deemed less honorable or just to record the fortunes of the Soldier of Christ, who having buckled on the whole armour of God, fights the good fight of faith for the salvation of immortal souls.

To the conscientious discharge of the arduous and important duties which attach to the Missionary character, far more onerous and painful than is dreamed of in the world's philosophy, we believe there are few who have brought to the work a greater amount of talent, natural and acquired, of industry more consistently, better, or more unceasingly directed, or more unbounded zeal than the Gentleman whose portrait is prefixed to the present number of the 'Review,' and of whose life we proceed to place before our readers a few brief, but interesting, particulars.

THE REV. WM. MORTON is a native of the Emerald Isle, having been born at Chapelizod, near Dublin, in the month of April, 1793: he is consequently in his fifty-first year. Mr. Morton's ancestors, however, were from Scotland, but settled in Ireland for the last two or three generations back, where they have intermarried with many of the best families in the Queen's county and county Limerick: the Dawsons of Portarlington, the Smyths, Verekers and others. The father of the subject of our sketch was Surgeon-General of the Irish Artillery, but joined the united Regiment at the union, and afterwards served both in England and abroad. Mr. Morton's parents were both spiritual Christians. His mother, the daughter of a clergyman of Limerick, was indebted for her first religious impressions to the great and justly venerated John Wesley.

Dr. Morton was by profession a member of the Episcopal church, but having been early impressed with just and scriptual views of spiritual religion, then became and ever after continued to view with equal affection and esteem true Christians of every denomination,

gladly holding communion with all, on the broad grounds of a *common* relation to Him whose body is *one and indivisible*, however variously compounded of *many* members.

To the early instruction and example of pious parents, and to the character of the society into which he was from his first childhood introduced, Mr. Morton was no doubt, under God, largely indebted for much insensible religious influence, afterwards more perceptibly developed about the 16th year of his age. It was at that early period—namely in the year 1808, that the first serious evidence of the actual power of religious truth appeared in Mr. M. Up to that time he had been mercifully preserved by Divine care and by parental vigilance, precept, and prayer, from indulgence in open vice or gross sin ; in that year, however, a very casual remark which dropped from the lips of one of the London Society's first Missionaries to the Island of Ceylon, where Mr. M.'s family then were, and on the eve of departure for China, became the seed of a Divine life. The impressions then made were subsequently deepened under the ministry of another admirable Missionary of the same Society, the excellent Mr. Loveless at Madras, and afterwards further matured under the fostering care of then Mr., afterwards the celebrated Dr., Robert Morrison of China, who in 1809 became Mr. Morton's brother-in-law by marriage with his eldest sister. These circumstances and relations, taken in connexion with the free intercourse with Christians of all bodies in his father's house, sufficiently account for Mr. Morton's readiness to co-operate with men of other Christian denominations long before he had formally left the episcopal for the independent body, an event in his history which has been much misunderstood and attributed to motives very far from the true ones by parties who were not in possession of these facts. The truth is, that Mr. Morton had, so early as the end of 1808, in the fervour of his first grateful feeling for the personal enjoyment of redeeming mercy, entered heartily into the Missionary enterprize, and devoted himself thereto in connexion with the London Missionary Society, under the immediate superintendance of his excellent brother-in-law. Ill health subsequently, however, disarranged the plan, and he was compelled, under medical advice, to return to Europe. On his arrival in Ireland he found himself within a large and influential circle of relatives and others, *all*, with the exception of his father and mother, in connexion, and that not loosely, with the establishment. On every hand he was urged to enter the Church, in which his maternal ancestors had for generations held spiritual office ; amongst whom were a late well known Archbishop of Dublin, Dr. Arthur Smyth, a Bishop of Limerick, his brother*, and many others, as also members of his father's family. Under their influence it was most natural that Mr. Morton should have been induced to take the desired step ; the more so as he had not at that time acquired a predilection for any particular form of Church Government ; not, indeed, having as yet studied the

* Of this family a maternal grand-uncle of Mr. M.'s, the late Wm. Smyth, Esq. built and founded the noble charity in the City of Dublin, in the well-known Chapel of which, *Bethesda*, in Granby Row, the Gospel has been preached for above half a century, as it yet is and. no doubt, long will be. This Gentleman and his benevolent Lady are advantageously mentioned in the memoirs of the late Countess of Huntingdon.

subject at all; nor did he for some years after. Still he long retained his wish to become an Independent minister, and had even made arrangements for entering the Hoxton Academy under Dr. Pie Smyth; but was prevented by his entering into the marriage relation with a lady who continued for many years to share his fortunes. This early marriage was at first disapproved of by his family, and for some years was a source of grief and embarrassment to himself; which, however, he ultimately, by his natural energy of character and persevering diligence, fully surmounted.

Mr. Morton was now compelled to resort to tuition for the support of a growing family; but having received the ground-work of an excellent education, which he improved by indefatigable application and intense study, he was enabled to embrace an opening which presented itself in the year 1817, when he was selected by the late admirable William Wilberforce, the friend of Africa, to fill the honourable and responsible post of Classical Professor and Chaplain in the College in the Island of St. Domingo, founded by the remarkable and gifted, but also unfortunate Christophe, then Henry the 1st of Hayti.

After receiving orders from Dr. Ryder, the good Bishop of Gloucester, Mr. Morton proceeded with his family to the West Indies. That he laboured there with his wonted assiduity and diligence is avouched by many testimonials to which we have had access, but which in such a mere sketch as our limits prescribe it is impossible to cite. We must content ourselves with referring to a statement which appeared in a late Report of the British and Foreign School Society, and by which it appears that all that *then* remained of the noble institutions of Christophe, overturned by the Révolution in which he lost his life, was traceable to the labours of Mr. Morton at the College, and Mr. Gulliver at the High School;—the present *teachers* of the Schools at Cape Haytien and other places, having been the well-instructed pupils of those gentlemen.

Anticipating the lamentable occurrences of October 1819, Mr. Morton had embarked for the United States in the July preceding. His visit to that country at this time, and also a former visit to New York on his way home from China in 1810, of course afforded many opportunities for personal observation of the effects of free republican institutions; and no doubt in the impressions then made, though not immediately developed, were laid the foundations of that admiration of free Civil Institutions and cheap Government, with the characteristic dislike of all the trappings of aristocratical forms of state or church, for which Mr. M. is noted.

In 1820, Mr. Morton returned to England, and settled near Liverpool, where he continued till 1823, performing the duties of a pastor, conjointly with the Rector, in the Church of St. Mark's in the town, and of West Derby near Toxteth. In these churches we have reason to know Mr. Morton officiated with great acceptance; of which an express testimony was borne by the principal gentlemen of the latter place, at the head of whom was the late Lord Sefton; while the large and attentive congregation that attended his ministry in the former argued similar satisfaction with his exertions, a fact ascertained as well from private sources. At west Derby Mr. Morton was particularly diligent in his visitation of the sick, and other pastoral labours involving no small amount of toil and exertion in so extensive a parish.

In 1823, Mr. M. finally succeeded in effecting his first wish of becoming a Missionary to India, having been recommended by the Bishop of the Diocese to the Society for the Propagation of the Gospel in Foreign Parts, under whose auspices he arrived in Calcutta towards the close of that year.

Mr. Morton has continued since that time to take a full share, with much zeal and diligence, in the many arduous labours entering into the amount of Missionary duties. He has studied several of the languages with much success, particularly the Sanskrit and Bengálí; in the latter he is considered an accomplished Scholar, and to be, in fact, amongst the most eminent, for the extent and accuracy of his attainments, of those that have entered on this line of study. Indeed, we have heard it urged that if a fault exist in Mr. Morton's Bengálí discourses it is that his language is at times somewhat too high or refined for the ears and understandings of that class of natives who form the principal portion of a native auditory. Though we do not subscribe to the truth of this opinion, of which, rather, we doubt the correctness, it is, at least, a compliment to Mr. Morton's taste and acquirements.

The productions of his pen are numerous. The chief of his published works are—1. A Dictionary of the Bengálí language accompanied with Bengálí Synonymes, which issued from the Bishop's College Press in 1829; a work not only of great labour and unquestioned value, but which we have heard pronounced to be the most perfect Dictionary of the language extant, and of which a second edition is now urgently called for:—2. An attempt to fix the Bengálí expression of Theological and Biblical terms, in which are some elaborate critical remarks intended as specimens of the principles applicable to the object:—3. A Bengálí version of the History of Daniel in a thick volume in 12mo:—4. Many Bengálí Sermons and Tracts, original and translations, together with a vast variety of papers in the '*Calcutta Christian Observer*,' '*Christian Advocate*,' and '*Asiatic Journal*,' on every imaginable subject, important, curious and interesting connected with the religion, philosophy, language, criticism, poetry, &c. of the Hindus. Among these are a detailed review of the Native Periodical Press of Calcutta, a critical Examen of all the published Lexicons and Grammars in the Language, Reviews of various Native works, memoirs of Bishop Corrie, and of the Missionaries Kiernander and Reichardt, &c.:—5. A revised edition of a very valuable work on Hindu Idolatry by the late Braja Mohan Deb, with an *English translation* and valuable notes, accompanied with an original Bengálí version of a singularly curious and excellent tract *on Caste* by a Buddhist Pundit; with an English translation and notes by Mr. Morton*: —6. A new translation in Bengálí of the Book of Solomon's Proverbs, lately printed for the Calcutta Bible Auxiliary:—7. An interesting collection of *native* proverbs, Sanskrit and Bengálí, accompanied with an English version and interpretation:—8. A Bengálí version

* This work has lately issued from the Asiatic Press, and is admirably adapted for benevolent distribution among the alumni of the Hindu College and other Institutions, who use the English Language; but who, from being unfurnished with *religious* instruction, are always in danger of running from contempt of Idolatry into an equally destructive *Deism* or Infidelity.

of the English Liturgy, pronounced by the very best judges, "a perfect specimen of Bengáli composition."

Mr. Morton's English works are :—1. A volume of Pulpit Discourses delivered in St. Mark's Church, Liverpool :—2. An Epitome of the admirable work on the Atonement by the late Archbishop of Dublin, Dr. Magee :—3. A similar Epitome of a useful work on the question "Why are you not a Socinian" by the late Mr. Freeston. Other very important works yet in MS. await only leisure, as we understand, to be put to press. Amongst these are "A translation of a Sanskrit volume containing the ethical and metaphysico-religious system of the Hindus : A treatise on Hindu Metrical composition, with numerous illustrations : An extended Grammar of the Bengálí Language, &c.

In the year 1830, ill health, and particularly a painful affection of the eyes, the consequence of long and severe study, obliged Mr. Morton to determine on a trip to England, and he accordingly embarked on the '*Lady Flora*'. By an untoward accident which occurred in the river during a dense fog, the vessel sustained considerable injury, though unperceived at the time. In less than a week after departure it was found necessary to put into the harbour of Trincomalee. Of this and subsequent events, Mr. Morton thus speaks in his letter to the Secretary of the Calcutta Diocesan Committee :—

During the three days of our stay at Trincomalee, I found opportunity for professional duty. My offer of service being readily accepted by the Commandant, I had the pleasure of conducting divine service on Sunday in the garrison church, the Chaplain having not long before our arrival taken his departure for England, and his successor not having as yet been appointed. I had also the opportunity of administering the sacrament of baptism to the child of the Wesleyan Missionary, Mr. George : but the use of a language foreign from all my previous studies precluded me, unfortunately, from addressing myself to the natives around, and from leaving the testimony of a Christian minister on the shores of the beautiful island of Serendib, on which a monstrous and demoralizing demon-worship exhibits the melancholy spectacle of a terrestrial paradise desecrated by the universal practice of the most appalling superstitions.

We had scarcely left Trincomalee, before we encountered what was supposed to be the indication of a late severe tempest from the westward ; an eight days' continuance of heavy seas proved too much for the strength of the ship, more shattered than had been to the last conceived by the previous injury inadequately remedied. At one time we bore up two days in the direction for Bombay, as a place of repair ; were then, from the hourly increasing apprehensions occasioned by the ascertained state of the vessel, about to make a second time for Ceylon ; but finally steered for the Isle of France as for the nearest land, notwithstanding the dangerous nature of its shores during the hurricane season then passing, which had deterred our commander from that course at an earlier period of the alarm.

Thank God, we reached Port Louis in safety, after a six days' agitating anxiety ; and after a further tantalizing and uneasy delay of three days in quarantine, again set foot on dry land, thankful all of us, I trust, to the God who rules in the tempest, and "holds the waters in the hollow of his hand."

At the Mauritius Mr. Morton was most kindly received by Sir C. Colville, the Governor, and his excellent Lady. Sir Charles entertained so high an esteem for Mr. Morton that he offered his interest with Lord Goodrich, then in the Colonial Department, for an appointment to a chaplaincy under his Government, which was of course readily obtained, backed as the recommendation was by that of the Chaplain General for the colonies, Archdeacon Hamilton, then Secretary

also to the Propagation Society. During a detention of nearly three months for the repairs of the ship, the salubrity of the climate, with considerable exercise on horseback, so far re-established his health that, as well from that consideration as from the lateness of the season, he decided ultimately upon relinquishing his trip to England and returning to Bengal. Subsequently to his return to the Presidency, his health having again declined he was, under medical advice and that of his friends, induced to accept the chaplaincy to the Seychelles dependancy, and proceeded thither accordingly ; but finding his sphere of exertion extremely limited, at the same time that he was too remote from the press to be able usefully to employ his pen, Mr. Morton relinquished his Government appointment, and returned a second time to India, where, a short interval for recruiting in England excepted, he has since continued to labour unremittingly.

That the successive Bishops of Calcutta appreciated Mr. M.'s services, is abundantly proved both by the free terms of personal intercourse in which he lived with them, and by the appointment of acting chaplain at Chinsurah and Howrah, which he received at three several times from Bishops Heber, Turner, and Wilson ; we have reason to know also that the favorable attention of Lord Combermere, the then commander in chief, was drawn to Mr. M. by the commandant of Chinsura, Colonel McGregor. Mr. Morton lived always on the best terms with the several successors also of that friendly officer, and was highly esteemed by them for his gentlemanly bearing and for the diligence with which he fulfilled the duties of his office.

That the Propagation Society also appreciated Mr. Morton's services is witnessed not only by the very handsome testimony to his zeal, talent and diligence, published in the Diocesan Report of 1832, on occasion of his removal to Mauritius, but also by the subsequent unsolicited vote of £100 a year by the board in London, "as an expression of their entire satisfaction with his conduct and exertions" during the whole period of his previous service in India.

Under these circumstances it was the less to be anticipated that any events should occur of a nature to lead to the dissolution of Mr. Morton's connexion with the Incorporated Society. This took place in 1835, and arose in its immediate causes out of a difference of opinion between Mr. M., (then acting as chaplain at Howrah, but at the same time carrying on his Missionary labours,) and the Diocesan, as to the extent of the jurisdiction of the latter ; originating in a misunderstanding, in which the late excellent Bishop Corrie, then Archdeacon and episcopal commissary, was intimately concerned, relative to the position Mr. Morton should occupy at Howrah, whether as *minister* subject only to the ordinary, or as officiating in subordination to the Professors of Bishop's College. The latter was the Bishop's view, the former that of Mr. M. himself and Mr. Corrie (whose original letters in proof we have been permitted to peruse). A long and painful correspondence ensued, which issued in Mr. Morton's refusal to accede to the Bishop's proposition. Other measures followed which Mr. Morton deemed arbitrary and vexatious, and to interfere materially with the useful application of his energies. After several years only of inward struggle, during which the whole question of the episcopal polity was reviewed, Mr. Morton finally resolved to withdraw himself from

the Bishop's jurisdiction, and sent in his letters of license accordingly. Unwilling to retire from the country, however, and from Missionary exertions, he immediately joined the London Missionary Society, having by an unanimous vote of its Missionaries been readily received amongst them." With them Mr. Morton labours with his wonted earnestness, with acceptance, and the most perfect cordiality. It is right to state that the act of their Missionaries in this country was unanimously confirmed by the Directors of the L. M. S. in England, after communication by its officers with those of the Incorporated Society, required as well additionally to confirm the judgment of their Calcutta Missionaries as to Mr. Morton's character and piety, as to avoid giving just offence to a kindred society. Nothing, therefore, could possibly be more satisfactory than the result. The lengthened period during which Mr. M. was deciding upon this step is in proof that he was not actuated by hasty emotion and unworthy passion, but by settled conviction and deliberate judgment.

Mr. Morton has taken a prominent stand on many occasions of public interest, as the annals of our various institutions shew, all of which have from time to time shared his advocacy and support. His published speeches at the *Black Act* and other political meetings, sufficiently attest Mr. M.'s love of freedom, his courage in asserting public rights, and his promptitude to employ both tongue and pen in their support.

As a Bengálí preacher, Mr. M. is reckoned superior to most—inferior to none in fluency, tact, and readiness. We have reason to know that the native public appreciate his abilities and are grateful for his exertions. As an English preacher Mr. Morton is characterized by solemnity, pathos and fervour. His doctrine is strictly what is termed evangelical : his language select, his style profuse, yet by no means excessive, remarkable for precision and clearness : his diction is rhetorical, his action often energetic, though by some deemed immoderate ; it indicates, however, the ardour of his feelings and the liveliness of his disposition.

In his mental character Mr. Morton is logical and orderly. He is not easily led away into new theories and fanciful speculations : the sobriety of his judgment is, indeed, singularly in contrast with the fervour of his temperament. His affections are strong, his feelings deep, their expression pathetic and impressive.

In his moral character Mr. Morton has never been impeached. While some disapprove of his evangelical leanings, others deem that he is too metaphysical in his divinity ; yet his orthodoxy is undoubted, but not obtrusive. His preaching is eminently practical. His volume of published sermons contain some beautiful composition though perhaps too ornate. Some of the opinions it advocated (in 1819) he has seen reason to modify or discard ; but what man has lived to fifty who has not been under the same necessity ? and who that has published so early, has not seen reason to change his views upon many subjects ? Obtuseness and obstinacy only never change : an ardent mind is sometimes hasty to take up, but as ready to abandon or modify an opinion when proved to be untenable ; and Mr. Morton pretends not, it is presumed, to be infallible.

Mr. Morton has been thrice married, and has a numerous family,

or rather two families, one of age, and now themselves settled in life ; the other, of four children, still at school in England.

The above we offer as, of course, but a mere sketch, yet sufficient to gratify the distant friends of Mr. Morton, anxious for a detailed though succinct account of his life and labours ; and cannot fail, we should think, to prove that he has devoted no small amount of talent, energy and acquirements to the service of the Christian Church, the heathen, and society at large.

Mr. Morton has dealt with the Muses and essayed to climb Parnassus, but has rarely published any of his poetical effusions. Though often entreated to let them see the light, he has always hitherto refused, deeming more lightly than his friends of his poetical powers. Of the productions which we have had the pleasure of perusing, some are sacred to associations and feelings which we desire to respect ; of others—forming a small volume now in preparation for the Press, to which he has at length been persuaded to commit them, —many are of a highly poetic character ; those, particularly, on circumstances and events of a personal or domestic nature breathe a spirit of tenderness and pathos which we were little prepared to find even from Mr. Morton's pen, though, as we have already intimated, the pathetic forms a distinguishing feature in his style as a preacher. Of these, as our readers will at once infer, though by far the most favourable specimens of Mr. Morton's poetical talent, we have no authority to place any before the public ; but as there are a few others to which these reasons and objections do not so strictly apply, we make no apology for their introduction here. Two of these, the Sonnets on "Religion" and "Home," we find in the 'New York Observer' of 7th Oct. 1836, accompanied by a short biographical notice, a portion of which, commenting on the public labours and private character of Mr. Morton we have pleasure in appending*, but feel it necessary to correct an erroneous assertion which the article contains, that Mr. Morton's first religious exercises of mind had been so intense as to occasion temporary aberration. This was a mistake originating most probably in the melancholy fact that his sister Mrs. Morrison had been for a season somewhat mentally afflicted under the united influence of climate and disease. The majority of Mr. Morton's poetical productions are of a grave and serious nature ; but there are exceptions of a highly humor-

* "For the New-York Observer. *Messrs. Editors,*—I send you inclosed two little sonnets written when far from home, and in deep affliction, by a Missionary in Hindoostan, who is not as well known in this country as he ought to be. It is the Rev. William Morton, of Chinsura, brother-in-law to the late Dr. Morrison. One reason why his name is not more familiar with us is that he is attached to the Church of England, having lately held a chaplaincy under the government of Mauritius, and now occupying a similar station at one of the British posts in Bengal. That he has been no slothful idler in the vineyard will be admitted when it is known that since his residence in India he has prepared a dictionary of the Bengálí tongue of upwards of 600 pages octavo, &c. ;— * *

[Here follows an enumeration of various works published by Mr. Morton at that period, and other matters already detailed in the body of the Biography.]

* * * —He possesses all the national ardour and vehemence of the Irish character, chastened by grace, and accompanied by a tenderness beyond that of women ; true to his friends, warm in his attachments, romantic in his feelings, lofty and devoted in his piety, he needs only to be known to be strongly loved."

ous character, one specimen of which, founded on a fact, will afford our readers a fair proof that he is not far behind his countrymen in his appreciation of the spirit of whim and drollery.

RELIGION.

SONNET.

Tossed on the trackless waste of life's rough sea,
'Mid storms wild rage oppress'd and tempest-borne,
All hopeless, cheerless, helpless, and forlorn,
Where looks the soul but to Eternity ?
Then, then, Religion, thou alone canst yield
Strength to the faint, and bid sweet Hope arise—
That bow of promise, o'er the darkest skies,
In pitying mercy to the soul revealed—
All is not lost, if but of thee possess'd ;
Firm anchor thou, and cast within the veil.
Rise, spring of joy, within this dreary breast,
Nor let thy streams of consolation fail.
Oh grace divine ! my care-worn heart prepare,
That God himself may make his dwelling there !

HOME.

SONNET.

Home—'tis the centre of our dearest bliss,
And seat of virtue : where the heart finds rest ;
Where mild delights and holy calm attest
All else but vain, save piety and this.
Here, far withdrawn from 'mid the busy crowd
Whom pleasure, wealth, or mad ambition lure,
Goodness and love a constant peace assure,
Missed by the gay, the splendid, and the proud.
Here heart to heart responds, with faith secure,
And ceaseless bids affection's tide to flow ;
The fretting ills of mortal life to cure
The only rivalry these happy know.
Oh ! grant me home, propitious Power above,
Whose breath is peace, whose highest precept, Love.

THE WORD OF GOD.

A SONNET.

Hark ! 'tis the word of God that meets the ear,
Calling to rev'rend heedfulness ;—to sounds
Of solemn import the struck heart rebounds,
With mingling hope and love and pleasing fear !
'Tis Heav'n's own message to the Sons of earth—
Of pardon to the guilty, and sweet peace ;
And to the prison'd soul a swift release,
In sin and sorrow pining from the birth.
Oh ! sweetest mercy, how divine thou art !
Then most display'd when most our misery cries.
Blest Spirit of light and purity ! impart
Thy holiest power, and let my soul now rise
To life and hope and joy and heav'nly love,
And born of God grow up for worlds above.

Howrah, 23rd *Feb.* 1834.

A SONNET.

TO ———

ACCOMPANYING A COPY OF BOWLES' POEMS.

Bowles ! in thy sweetly sad and tender verse
I love the deep-felt sorrow so resigned,
Which thou, with such meek piety combined,
Dost in such touching eloquence rehearse.
Not thine the stormy grief and wild excess
Of those whom disappointment's poisoned dart
Goads into madness—though it reach thy *heart*,
Yet canst thou bow and Him who willed it bless.
Oh ! for a kindred spirit to thine own,
To kiss the rod and Him by whose behest
It trains for worlds where light and joy are sown,
And patient sorrow finds its blissful rest !
Such for myself, Belov'd, and such for thee
The grace I ask—in Bowles its virtue see !

28th March, 1828.

THE MEMORY OF YOUTH.

1.

I love the bright smile on the face of youth
  With innocence sweetly worn ;
The ingenuous blush and the lip of truth,
  And the simple prayer up-borne.

2.

They bring back the memory of days gone by,
  When cheerful and gay was my heart ;
When hope was yet rife and bright was my eye,
  And unfelt disappointment's smart.

3.

When passion was still in its germ enclosed,
  And innocence, pure and free,
Nor shrunk from the eyes of the world exposed,
  Nor the High One's scrutiny.

4.

When feeling was deep and warm and true,
  As in bosoms of light might glow ;
Nor the chill of suspicion its dark shade threw
  On the sunshine of life below.

5.

When Fancy in rainbow-colorings dress'd
  The Vista of distant years ;
And the future, all sunny and bright and bless'd,
  Was unclouded by sorrow or fears.

6.

Oh days of my childhood, how swiftly fled !
  Now in memory alone are ye :
And many sleep low in their last green bed,
  Who shared your delights with me.

7.

'Tis sweet with the balm of the past to assuage
  The cares of our lengthening years ;
With the light of our youth gild the clouds of age,
  And brighten the vale of tears.

8.

Oh ! I love the bright smile on the face of youth,
With innocence sweetly worn ;
The ingenuous blush and the lip of truth,
And the simple prayer upborne.

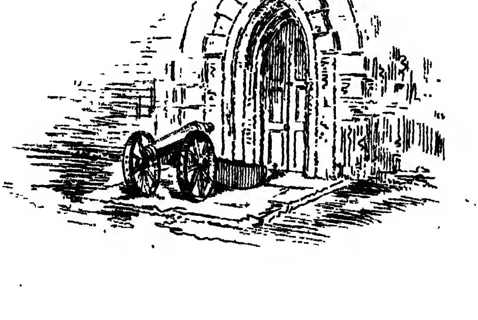
26th March, 1832.

THE CHURCH CANON.

A TRUE STORY.

A soldier once a reverend priest addres'd,
And begged to be in marriage rites made bless'd.
To him the priest—most readily, my friend ;
At ten, A. M. to-morrow, I attend.
To-morrow came, but haplessly the man
Delayed to come and swift the moments ran.
Patience exhausted and eleven expired,
The Church was closed, the priest and clerk retir'd.
At length, with sundry friends, in joy and pride,
Arrived the warrior and his blushing bride.
But lo ! no opening doors their steps invite,
Nor surpliced parson fills them with delight.
Astounded, swift he to the vicarage hies,
Love in his heart, impatience in his eyes,
And begs his Reverence will not more delay
To do his office in the wish'd for way.
Pr.—I 'm truly sorry, friend, indeed, he said ;
I waited for you, but the hour has sped ;
'Tis now past twelve—to-morrow I am yours :
The fault 's not mine ; but patience all things cures.
S.—Patience ! your Reverence, with a dismal look,
Exclaimed the soldier, while his courage shook—
Sure, Sir, it matters not a straw or hair
What hour of day poor folks like us may pair ;
And 'twould for certain be a mortal sorrow,
If we must wait to wed until to-morrow.
Pray, Sir, make haste, for you the party waits,
Expecting till your word bid ope the gates.
Pr.—I can't indeed, for know the church has got
A *Canon* full against it ; I dare not.
S.—A *Cannon*, please your Reverence ! by the powers !
If that be all, Sir, say no more of hours ;
I 'm an artillery man, a bombardier,
And faith I'll move the Cannon, never fear !
He would—but art still left him in the lurch,
For vain is art 'gainst *Canons* of the church.

28th May, 1830.



ORIGINAL COMMUNICATIONS.

HISTORICAL RESEARCHES.

By the Late Lieut.-Col. W. R. Pogson.

(*Continued from page* 290.)

The seat of Cush.

It is manifest in many parts of the Scriptures that Ham was the progenitor of the Egyptians, as exemplified in the 51st verse of the 150th Psalm. "Then Israel came out of Egypt and Jacob was a stranger in the land of Ham," and in the 78th Psalm, "He slew all the first born in Egypt even the beginning of their strength in the tabernacles of Ham." In Thebaida also is found the city named Cheramis, or that of Cheram or Ham; but it may have received that name from Hiram sometimes spelt Chiram, king of Tyre *. Herodotus mentions the island of Chiramis in the same region.

Cush, or Koosh, being the elder son of Ham, it is necessary first to mention him and to prove that he was not an Ethiopian as has been supposed; because establishing that point corrects various discrepancies and erroneous interpretations. On this subject the Septuagint and Josephus have failed to come to the manifest conclusion that the land of Cush was not Ethiopia, but Arabia Petrœa and Arabia Deserta, which were peopled by Cush and the Chusites after they left Babylonia where they first settled. Nothing can more clearly solve this question than Numbers xii. where the wife of Moses is called a Chusite, and some parts which treat of the conquests of Nebuchadnezzar. If we give credit to Moses himself, it will appear that Josephus was mistaken or misled by his invention in assuming Cush to have been Ethiopia, and therefore the wife of Moses to have been an Ethiopian: he pretends that Tharbis, the daughter of the king of Ethiopia, became enamoured with the fame and person of Moses when he besieged Saba, her fathers city, and in order to *espouse* him consented to betray her parents, country and friends, by surrendering the city. If the tale be worth recital it is thus mentioned in Josephus. After describing the strength of the Ethiopian city Meror, so called by Cambyses from the name of his sister, its ancient appellation having been Saba, he continues in these words †. Hic cum Moses desidere exercitum otiosum aegre ferret, hoste non audente manus conserere, tale quiddam accidit. Erat Ethiopiae regis filia, nomine Tharbis &c., &c. While Moses was grieved that his army lay idle because the besieged dared not sally and come to blows, Tharbis, the daughter of the king of Ethiopia having in some assaults beheld Moses, and admiring his person and valour, and aware that he had restored the declining power of the Egyptians and reduced the Ethiopians to the verge of subjugation, sent a trusty servant with a proposal to become his wife, to which Moses consented on condition that she should first surrender the city, and having bound himself by an oath to fulfil the contract, the city was placed in his possession. This tale, not having been mentioned by Moses, is evidently the invention of Josephus, who

* Herod. in Euterp. † Antig. l. 2. c. 5.

farther errs in naming a city of Arabia as one of Ethiopia, and also in asserting the wife of Moses to have been an Ethiopian instead of an Arabian,—Saba not having been in Ethiopia but Arabia, as is affirmed by Strabo and all other ancient and modern Historians, who inform us that the Sabians were Arabians, unless Josephus can persuade us that the Queen of Saba who came to hear the wisdom of Solomon was a negress.

The scriptures inform us that Moses married the daughter of Jethro priest of Midian or Madian, but that does not militate against her having been an Arabian, because Midian was on the northern side of the Red Sea near Ezron Gaber, where Solomon prepared his fleets for Ophir, in the region of Edom, and may therefore be included in Arabia, as the Red Sea is called Sinus Arabicus; for Edumœa joins the land of Juda on the north; Arabia Petrœa on the east; the Mediterranean on the west and the Red Sea on the south-east. If we observe the tract chosen by Moses when he conducted the Israelites from Egypt, it will be apparent that he was no stranger to Arabia, in which, and on its border, he had previously lived forty years, and where, besides having been carefully educated in Egypt, he was instructed by Jethro in the learning of the Egyptians. The assumption of Josephus is further refuted in Exodus ii. 15.—where it is written 'when Moses kept the sheep of Jethro his father-in-law, priest of Madian, and drove the flock to the desert and came to the Mountain of God in Horeb,' for every one knows that Horeb is not in Ethiopia; and if we may credit Moses himself his wife was not obtained in the manner related by Josephus, nor was her name Tharbis, but Sippora or Zippora, neither was she a Negress but a Midianite. As God by the simplest means accomplishes the greatest ends, so was he pleased from employment as Shepherds, to call Moses and David to deliver his people. Moses * disconsolate and a stranger, sitting by a well, defended the daughters of Reguel from the other shepherds, and drew water for their sheep, when, as ordained by God, he was entertained by Jethro and married his daughter, and not for betraying a city, &c. This opinion of Josephus is condemned by Augustinus Chrisamensis, where he denies the assertion of Apollinaris, of Moses having married both Tharbis and Sippora commencing with these words †. Mentitur etiam Appollinaris duas uxores habuisse Mosen, &c. Appollinaris lies in affirming that Moses had two wives, and it is evident that these tales are feigned, for the wife of Moses was Zippora daughter of the priest of Madian, which cannot be mistaken for Ethiopia beyond Egypt, because it joins Arabia ‡.

As Cush is by the Septuagint rendered Ethiopia, and the wife of Moses therefore called Ethiopica, so in the conquest of Nabuchodonosor Ethiopia is written for Arabia; for it is evident by the words of Ezekiel that Nabuchodonosor was never in Ethiopia. Referring to him, Ezekiel says §, I come upon thee and upon thy rivers, and I will make the land of Egypt utterly waste and desolate, from the tower of Seveneh even to the borders of the black Moors. The last words should have been rendered from the tower of Seveneh to the borders of the Chusites or Arabians, the whole of Egypt being situated between them; for, to say

* Exod. ii.
† Sext. Senens. Bibb.
‡ Chrisamensis.
§ Ezek. xxix. 10.

the country between Seveneh and Ethiopia, has no more sense than there would be in saying between Berwick and Scotland.—Berwick being on the northern extremity of England, and Seveneh the southern boundary of Egypt in Thebaida, which joins Ethiopia; but it appears by the words of Ezekiel that Nabuchodonosor never entered Ethiopia, although the Septuagint, the Vulgate, the Geneva and other versions have Ethiopia for Cush. Another passage in the 9th verse of the xxx chapter of Ezekiel is in like manner erroneously converted. 'In die illa egredientur nuncii a facie mea in trieribus ad conterendam Æthiopiœ confidentiam,' which is thus translated by the Genevans. 'In that day shall their messengers go forth from me in ships to repel the presumptuous Ethiopians,' &c. The Latin has the Greek word Trieres for Triremes, which are galleys with three decks of oars and not ships; but the translation should here, as in the former instance, have been Cush or Arabia, instead of Ethiopia; since it is evident that no ships or galleys could proceed from Egypt to Ethiopia, those countries not being separated even by a river. This passage, therefore, is intended to signify that Nebuchodonosor should send galleys on the Red Sea, by which an army might have crossed to Arabia without the long march through Egypt and the desert of Pharan; for when he was at Seveneh, a mile from Ethiopia, he required neither galley nor ship to pass into it, and if he had attempted to row up the river, he could not have done it, for the falls of the Nile over high and steep mountains, called Catadupœ Nili, intervened. The sons of every father settled as near to each other as possible. Gomer and his sons in Asia Minor. Javan and his sons in Greece and the adjoining Islands. Shem in Persia and eastward; so the sons and grandsons of Cush settled near the river Gehon where their father dwelt; Nimrod aud Havillah on one side and Saba, Sheba, Sabtecha and the rest, on the other, and it nowhere appears that the Hebrews ever had any war or other intercourse with the Ethiopians. In various other places also Ethiopia is erroneously placed for Cush or Arabia, by which one region is mistaken for another, for what sense has Isaiah xviii as it is rendered by the Vulgate 'Vœ terrœ cymbalorum alarum quae est trans fluvios Ethiopiœ?' 'Woe to the land of the cymbals with wings which is beyond the rivers of Ethiopia,' or according to the Septuagint 'Vœ terrœ navium alarum quœ est trans fluvios Ethiopiœ,' 'woe to the land shadowing with sails which is beyond the rivers of Ethiopia.' Junius has it 'Vœ terrœ umbrosœ orœ,' 'woe to the land of the shady coast,' according to the English Geneva.

The two first interpretations of the Septuagint and St. Jerome understand it in the sense of the waters being shaded by the sails which are metaphorically called the wings of a ship, the others that the sea was shaded by the height of the land. No interpreter has doubted that the land alluded to in Isaiah xviii. is Egypt; for they were the Egyptians who sent the Israelites the message therein mentioned, and by the other interpretation, every one may see the transposition of the countries by which Egypt is placed on the other side of Ethiopia, which is brought in juxta position with Judea, while it is the land of Cush or Arabia which lies between Judea and Egypt, but not Ethiopia, which is under the equinoctial line. Beroaldus asks this pertinent question,—what region could that be of which the prophet speaks beyond the rivers of Ethiopia? 'Nam de ignota agi regione dici nequit:' for it cannot be

said that he treats of an unknown region, since if the Jews had no intercourse with Ethiopia, and it is placed under the equinoctial line, it is still less probable that they should have known nations beyond that country, unless it be impiously supposed that the prophet spoke without sense or meaning of regions which were not then discovered ; Sesostris having been the first whose vessels passed the Cape of Good Hope, or Bona Esperanza as it was named 2000 years afterwards on being discovered by the Portuguese*.

Similar mistakes exist in the accounts of Senacherib and Asa—where Tirrhacah in the former and Zerah in the latter are erroneously termed Ethiopians. The translation of the story of Senacherib misstates the cause of his retreat; for he was first repulsed at Pelusium, which is at the entrance of Egypt from Judea. Having received intelligence that Tirrhacah, whom all interpreters call king of Ethiopia †, was advancing to attack him, he retired, and in order to avoid dividing his army, sent messengers to induce Hezekiah by threats and intimidation to submit. The tenor of their declarations mentioned in the 2nd book of Kings, is —Have any of the Gods of the nations delivered his land out of the hands of the king of Ashur ! Where is the king of Hamath and the king of Arpad, and the king of the city of Sephaivaim, of Henah and Iva ‡ ! It was his intention, if the object of his mission had succeeded, to have united the army commanded by Rabsakeh, which invested Jerusalem, with that which was before Pelusium, a great city on a branch of the Nile adjoining Arabia ; for Senacherib had with a third army, which he in person commanded, subdued most of the cities in Judea and the portion or land of Benjamin, and was then at the siege of Lebna. On the rumour of the approach of the Arabian army, led by king Tirrahakeh, whom Josephus § calls Tharsices, Rabsakeh hastened from the siege of Jerusalem, and found Senacherib had quitted Lachish and invested Lebna, which was afterwards named Eleutheropolis. During his failure at Pelusium—and his fear of Tirrhakeh—God, whom he least feared, destroyed 185,000 men of his army in one night ‖. Josephus plainly shews that the army of Tirrhakeh came from Arabia ; for in the first chapter of the tenth book of the Jewish antiquities, it is stated that it had come to the knowledge of Senacherib, that the army which was approaching to the relief of the Jews and the Egyptians advanced by way of the desert, and that between Jerusalem and Pelusium was the desert of Pharaoh or Sur, extending to Arabia Deserta—Arabia Petræa —and Arabia Felix, and by no other way could the Arabians approach those places. But no historian ever heard of a desert between Pelusium and the southern part of Egypt. It consequently appears that 2 Kings xix. 9. has the same mistake, the word Chush being there also translated Ethiopia—and in this sense all the interpreters, except Junius, have expressed the beginning of the 9th verse. 'He heard also men say of Tirrhakeh, king of Ethiopia,' &c. Whereas it should have been rendered as Junius has it,—'Audiens autem de Tirrhakeh rege Chushi ;' He heard also of Tirrhakeh—king of the Chusites ; for they were the Chusites and Arabians whose dominions adjoined those of Judah, and not the Ethiopians, whom Pliny ¶ mentions never to have been concerned

* Sir Walter Raleigh. † Joseph. l. 10. c. 1. ‡ 2 Kings xix.
§ Pliny. l. 5. c. 9. ‖ Antig. l. 10. ¶ 2 Kings xix. 35.

in wars. Tirrhakeh was no more king of Ethiopia than Zerah who invaded the teritory of Asa * king of Judah, with an army of a million of men, and 300 chariots, and it is not probable that such a force would have been suffered to advance unopposed through the dominions of the powerful kings of Egypt. Neither were the Ethiopians a warlike nation and still less conquerors ; yet Zerah is also called king of Ethiopia. Cush being thus mistaken for Ethiopia by the Greeks, whom the Romans followed, the river Gehon was accordingly rendered as the Nile. The proper country of the Ethiopians lies to the south of Egypt and was called Thebaides, which is often mentioned in the Egyptian stories, and supplied many of the Egyptian kings. Ethiopia is alleged to signify the land of men with black or burnt faces, and to be very near or directly under the equinoctial line, which is very far from the region of the Chusites, who are neither black nor belonging to the torrid zone. Pererius attempts to explain this erroneous translation of the Septuagint by stating that there were two countries named Ethiopia, the one lying east of the other,—finding this divison in Strabo who derived it from Homer ; and because there is no ground to make Chus Ethiopia in Africa, Pererius makes the land of Chusites the eastern Ethiopia—instead of Arabia Petrœa, Arabia Felix, and the adjoining region of Midian. If it be admitted that the land of the Chusites is the tract from Sur to Havilla, according to the Scriptures 'Habitavit Ishmael † ab Havilla usque Sur quœ respicit Ægyptum—introentibus Assyrios'—'Ishmael dwelt from Havillah as far as Sur which is towards Egypt as you go to Assyria,' which sufficiently proves that the Gehon cannot be the Nile but a river of Cush and not Ethiopia. The passage habitavit, &c., implies that Ishmael dwelt from Havilla, which borders on Assyria and Sur towards Egypt,—or in other words, the issues ‡ of Abraham consisting of twelve princes, whom God promised to make a great people, inhabited the regions between Assyria and Egypt. They were accordingly so multiplied that when Zerah the Chusite, whom other writers call Tharantha, brought an army of a million men against Asa, king of Judah, it is not to be supposed that such an army passed from Ethiopia through the powerful kingdom of Egypt in order to invade Palestine ; and still less, that Palestine, or the kingdom of Judah, could be in juxtaposition with Ethiopia, from which it was separated by Egypt and Arabia. That army consisted of the Chusites, Amalekites, Midianites, Ishmaelites—and Arabians ; for it is written that after Asa had, by the divine aid, defeated that numerous host, the fruit of his victory was the capture of some of the cities of king Zerah—and Gerah is named as one of them, and seems the same word, and if so it implies that he took Gerah or Zerah the capital of the king of that name. No one can suppose Gerar to have been a city of Ethiopia ; it being disproved by the Scriptures §. 'And Abraham departed thence towards the south country and dwelt between Cadesh and Sur and sojourned in Gerar :' now Sur is that tract which Moses and the Israelites entered as soon as they had crossed the Red Sea, where they were attacked by the ‖ Amalekites in Rephidim, under the supposition that they were, from fatigue, unable to resist. It is also written in the ac-

* 2 Chron. xiv. † Gen. xxv. 18. ‡ Gen. xxv. 16.
§ Gen. xxvi. 1. ‖ Gen. x. 11.

count of Isaac *, wherefore Isaac went to Abimelech and the Philistines unto Gerar—and they were certainly not Ethiopians; and lastly Moses describes the bounds of Canaan in these words †; 'Then the border of the Canaanites was from Sydon, as thou comest to Gerar'; for Sydon was on the northern and Gerar and Gaza on the southern frontier of Canaan. It is plain therefore that both the Septuagint and Josephus have mistaken this place, and that although Pererius endeavours to explain Chus to be Ethiopia, Homer's east and west Ethiopia are found elsewhere: for Pliny ‡ cites Homer as an authority for both—but the east Ethiopia is that which lies immediately to the South of Egypt and now a part of Abyssinia; and the western Ethiopia that which is watered by the Niger and now called Senega and Gambia—where the Ethiopians are named Perorsi, Daratiles and other appellations which Pliny enumerates; but all these are beyond the deserts of Africa—as stated by Pliny on the authority of Homer, Agrippa and Juba; while Chush and the region of the Ishmaelites, &c., are directly north from Ethiopia and beyond Egypt, and as far north as Lebanon, as far east as the Arnon, and west as the Mediterranean Sea. The gross error of Josephus further appears in his fiction of Moses when he served Pharoah in the wars against the Ethiopians; for making Chush Ethiopia is in fact removing Midian over the Red Sea and beyond Egypt. Pererius confesses the impropriety of translating Gihon as the Nile, ascribing it to an error in the Greek copy; and the Septuagint have thus rendered this passage of the prophet Jeremy §. 'And what hast thou now to do in the way of Egypt to drink of the water of Nilus?' 'Quid tibi vis in via Œgypti, ut bibas aquam Gehon'—at which Pererius observes, "profecto Hebraice ibi non est vox Gehon sed Sichor, quae significat nigrum et turbidum.'—The word Gihon is not found in this place, in the Hebrew, but Sichor which signifies black and troubled water.

In the Scriptures the four nations, namely, the Midianites—the Ishmaelites, the Amalekites, and the Chusites, are everywhere mixed and included in the general name of Arabians, and are called sometimes by one or other of those names, as in Genesis xxxvii. 25, 27, 28—where it is mentioned that Joseph was sold to the Ishmaelites, and in verse 36—that the Midianites sold Joseph to Potiphar. The Genevans, to avoid confounding these nations, say that Moses wrote according to the opinion of those who supposed the Midianites and the Ishmaelites to be the same; but he followed no opinion, having written the truth; for it appears in this place that they were all Arabians, and that when they bought Joseph, their camels were laden with spices, balm and myrrh, which were the articles of trade of Arabia Felix, from whence chiefly and from the East Indies the world was then supplied with myrrh, frankincense and spices received from the eastern coast of Arabia. It is further said in Genesis chapter xxxix. 1. that Potiphar bought Joseph of the Ishmaelites, who are by the Chaldean Paraphrast termed Arabians; and in Judges vi. it is said "when Israel had sown, that the Midianites and the Amalekites, and they of the east, came upon them." The people of the east, were the Arabians of the desert; as before in the buying of Joseph the Midianites and the Ishmaelites were blended—so here the Midianites are made one people. In the account of Gideon, the ‖ Midianites only are named, as including both nations—which are again called Ish-

* Exod. xvii. 8. † Gen. x. 19. ‡ Pliny l. v. c. 8. § Jer. ii. 18. ‖ Judges vi.

maelites * and neither Midianites nor Amalekites: for they had gold earrings because they were † Ishmaelites—who were a great, valiant and warlike nation. 'Manus ejus contra omnes et manus omnium contra eum'—'his hand, said God, in regard to Ishmael, shall be against all men, and every man's hand against him. From these Ishmaelites came the Moohumudan Arabians, though some writers think Moohumud was descended from the Schenitœ. Towards the south-east are the Midianites and Chusites: beyond them, towards the deserts of Arabia, the Amalekites,—who are all Arabians and form one nation.

The erroneous translation of Ethiopia for Chus is also conspicuous in the following passage,—'so the Lord stirred up against Jehoram, the spirits of the Philistines and the Arabians which confine the Ethiopians.' It is so written by Jerome. The Geneva has it—'which are beside the Ethiopians'; but it should have been, 'so the Lord stirred up against Jehoram the spirits of the Philistines and Arabians which confine and border on the Chusites.' Neither is it probable that Moses could have mistaken the Nile for the Gehon; for having been cast into the Nile—preserved in a basket of bulrushes—raised from infancy to maturity, and having performed numerous miracles on its banks, no one could have known the Nile better than himself.—It is often named in the Scriptures, but never as the Gehon. The Nile is twice called Sichor, once in Isaiah ‡ and again in the book of Jeremiah §: and is not termed by them a river of Ethiopia but of Egypt. In short, the Israelites had never any intercourse with the Ethiopians—or trade to the south, beyond Egypt. The enemies of the Israelites on the south and east of their possessions were the Chusites, Philistines, Ishmaelites,—Amalekites and the Midianites, who under petty kings or reguli, were included in the general name of Arabians. On the north side of Canaan, they were subjected to the hostility of the Cœlesyrians—the Magogians—the Tubalines, and their confederates; and internally—the nations which remained of the ancient Canaanites, who held the strongest cities on the sea coast—namely Tyre, Sidon, Acon, Gaza, &c., and Jerusalem itself was withheld from the Israelites by the Jebusites from the time of Moses to the reign of David.

* Raleigh. † Isa. xxiii. 3. ‡ Jer. ii. 18. § Sir Walter Raleigh.

"CUSH, or Ethiopia, usually rendered Ethiopia in our English Bible, has a very extensive signification. It comprehends all the southern and eastern borders of Egypt. In some parts of the prophecies of Ezekiel, it plainly denotes African Ethiopia, or Nubia and Abyssinia, * * (Isa. xviii. 1. xx. 3. Ezek: xxx. 5, &c.) But in others it must signify Asiatic Ethiopia, or Arabia, as in the description of the Garden of Eden. (Gen. ii. 13.) The wife of Moses was contemptuously styled a "Cushite" or Ethiopian of Arabia (Num: xii. 1.) And where Persia, Ethiopia and Lybia" are recited in order, the second must denote Arabia. (Ezek: xxxviii. 5.)" (*Dr. Hale's Analysis.*

"The vulgate, Lxx, and other interpreters, ancient and modern, generally translate *Cush, Ethiopia*: but there are many passages wherein certainly this translation is erroneous, * * Thus there are, at least, three countries named *Cush*, in Scripture, and all confounded by interpreters, under the general name of *Ethiopia*.

This distinction is of greater importance than it may at first appear, as by attributing to one country, called *Cush*, what properly belongs to another, much confusion ensues, and confusion, too, of a nature not easily remedied. It should be, however, remembered, that all ancient writers have at least equal confusion in their descriptions of *Ethiopia (Cush)* and arising from the same cause—the different families of the *Cushites*." (*Calmet's Dicty. of the Bible.*)

ANNALS OF ST. ANDREW'S CHURCH.

In giving a short sketch of the history of the Scotch Kirk in Calcutta we cannot steer clear of various controversies of which it has been the subject and scene; but we shall endeavour to allude to them with as much impartiality as possible, and to act the part of the faithful chronicler rather than of the controversial partisan. In fact we shall do little more than quote documents, and leave our readers to draw their own conclusions from them. First of all, then, we extract the very meagre detail given in Hansard's Parliamentary Debates of the proposal to introduce a clause into the Honorable East India Company's charter, for the appointment of Scotch Chaplains at the three presidencies :—

House of Commons, July 2, 1813, *in Committee.*

Mr. W. Dundas then proposed a clause for the appointment of three Scotch clergymen, one at each presidency, with a salary of £1,000 per annum each.

Mr. W. Smith thought the house would act inconsistently if it adopted the last clause (as to the Institution of a Mohammedan College) and rejected this.

Lord Castlereagh insisted that the house had not adopted the last clause but for discussion, and that they appeared disinclined to this.

Mr. Horner maintained that the Church of Scotland was as much a national establishment as the Church of England, and unless it was agreed that India belonged to England and not to the united Kingdom, all those motives of dignity, integrity and decorum which applied in support of a Church Establishment went also to favor the support of the Presbyterian Church, especially as it had been stated that the Scotch in India exceeded the English by two to one.

The Chancellor of the Exchequer thought the argument went too far: it went to say that wherever there was an establishment for the Church, there should be one also for the Presbytery.

Mr. Grant, sen., thought the clause ought to be adopted.

Mr. Finlay supported the clause.

A division then took place.

For the clause	18
Against it	20
Majority against it	2.

House of Commons, July 13.

"When the Speaker arrived at the clause respecting the church of Scotland, Lord Castlereagh proposed that it should be omitted, arguing that a legislative enactment, commanding the Company to maintain chaplains or ministers in each of the presidencies would be impolitic, and might lead to misunderstandings in our other colonies.

Mr. W. Dundas observed, that the clause in question had originally been introduced at his suggestion, but that having received an assurance from the Company, that they would at their own expence maintain the Presbyterian ministers, and afford them all proper means and assistance in the promulgation and exercise of their faith, he had consented that the clause should be withdrawn.

Mr. R. Thornton said, that as chairman of the Court of Directors, he was confident he could assure the House, and particularly the Scotch members, that the East India Company would do not only all that was necessary, but all that could be reasonably required.

Mr. Grant, sen., confirmed this statement, and pledged the Company, as far as he possessed the power, to endow churches, and provide maintenances for the clergymen of the church of Scotland.

Mr. Abercromby doubted whether under the provisions of the charter of 10th W. 3, the Company could allow any ministers to proceed to India who had not the licence of the Archbishop of Canterbury, unless under the higher sanction of a legislative enactment. He, therefore, proposed an amendment, that the clause should be retained, introducing the words, " it shall, and may be lawful for the Company to allow Presbyterian ministers to proceed to India."

Mr. R. Thornton could not answer for the Archbishop of Canterbury, it was not his province; but he thought he might answer for the readiness of the Company.

After a few words from Lord Castlereagh, Mr. Abercromby's amendment was negatived, and the clause was omitted, Mr. Abercromby, however, warned the Company, that he should narrowly watch their actions, and if they did not act up to the letter of their undertaking, he should submit a motion upon the subject next session, when he expected to be told, that it had been found impossible to carry the promise they had made into execution."

Let us now make a few remarks on these memorable debates. We believe that the statement to which Mr. Horner refers was incorrect. We do not suppose there ever was a time when the number of the Scotch residents in India was double that of the English, but at the

period in question the proportion of Scotch to the whole number of British subjects was unquestionably very large. But supposing that instead of two Scotchmen to one Englishman there were two Englishmen to one Scotchman, it surely was no very unreasonable demand that three Chaplains should be appointed for the instruction of the Scotch, when a bishop, three archdeacons and thirty-two Chaplains were appointed for the benefit of the English. We are not members of the Scottish Church establishment, but as Scotsmen we feel that an insult is offered to our country when any thing is done by the British legislature in controvention of the doctrine laid down by Mr. Horner, that the Church of Scotland stands in precisely the same relation to the British government with the Church of England. By the most solemn act to which the national faith was ever pledged, the privileges of each are placed on precisely the same footing, and every Scotchman is bound to vindicate these privileges. We are therefore inclined to be of opinion that the representatives of Scotland in the National parliament should not have consented to accept of a mere promise from the Court of Directors instead of an authoritative clause in their charter. The Court, however, appear to have honorably redeemed their pledge.

On the 11th April, 1814, the Rev. James Bryce, than whose name few are now better known in Calcutta, was appointed by the Court of Directors first minister of the Scotch Church in India. Mr. Bryce was recommended to the Hon'ble Court by the fact of his having gained the prize proposed by Dr. Claudius Buchanan to the members of the University of Aberdeen for an essay on the best means of Christianizing India. The Chaplain left England in the same ship that brought out the first bishop of the English Church. He arrived in Calcutta on the 28th Nov. 1814.

Our next quotation shall be from the Life of Bishop Middleton by Mr. Webb Le Bas :—

"Among the various denominations of Christians settled at Calcutta and the other presidencies, were many most respectable members of the Scottish Church. Up to that period, however, they had nothing resembling an establishment in India, and had, without any apparent dissatisfaction, conformed to the English mode of worship; and some there were among them who did not scruple to avow their preference for it. Most certain it is, that no petitions had been presented by them, from any part of India, for a separate establishment, or provision in favour of their own peculiar worship and discipline. The projected appointment of a Bishop of India, seems, nevertheless, to have suddenly revived, in certain quarters, the memory of the Presbyterian discipline; and, with it, to have excited a resolution to assert, in its behalf, a community of honour and privilege with the Church of England. Towards the close of the discussions in Parliament on the renewal of the Company's charter, some Scottish members of the House of Commons proposed the insertion of a clause, authorising "the appointment of a clergyman of the Scottish persuasion, at each presidency, with a salary of 1000*l.* per annum, each." It was replied, that for the legislature to sanction any other clerical establishment than that of the episcopal Church of England, would involve a principle highly impolitic, and one which might lead to misunderstanding in all the British colonies; namely, that every establishment of the English Church in our dependencies, must be accompanied by an establishment for the Kirk of Scotland also. It was accordingly decided that no such legal sanction could be given to the Presbyterian worship. The Scottish Kirk, being thus unrecognised in India by any legislative act, was, of course, left precisely in the same condition with every other form of dissent from the national scheme of ecclesiastical polity. This view of the matter, however, does not appear to have been altogether satisfactory to the honourable Court of Directors: and, as the charter had left them in possession of the revenues and the patronage

of India, they resolved to exert this general power in the endowment of Presbyterian churches, and the maintenance of Presbyterian ministers, at each of the three presidencies. The effect of this resolution was to place the Scottish clergy in India, on the same footing, in the public estimation, with the English chaplains. They each produced similar documents for their appointment, drew the same incomes from the government treasury, maintained the same correspondence with the civil and local functionaries, and, therefore, appeared to the public, (who made no strict enquiries into legal rights,) as invested with the same authority. These impressions were confirmed by the proceedings of the General Assembly in Edinburgh, which passed a resolution, recognising the Scottish Church in India, as a branch of their own, and empowering the members of the Presbyterian communion to hold kirk sessions at each of the presidencies, and even to elect elders, as representatives to that assembly. The effect of all these measures on the public mind was, no doubt, further strengthened by the remarkable fact, that the very same ship which conveyed the first bishop to govern the English Church at Calcutta, took out, likewise, a Scottish divine (Dr. Bryce) to found a Presbyterian establishment at the same place.

Under circumstances so favourable to the cause he had to represent, it is, perhaps, not very surprising that the Scottish divine should lose sight of the otherwise obvious distinction between an establishment paid by the local government, and acknowledged by his own spiritual superiors, and an establishment which had, exclusively, received the sanction of the British legislature. Unhappily, however, his zeal and confidence were displayed in a manner by no means remarkable for temperance or discretion. He had actually applied to the Bishop for the alternate use of the Cathedral. As this, of course, could not be granted, he had, for a short time, the use of the college-hall; and in that place delivered his first sermon in January 1815. This composition he immediately printed, with the title of "A Sermon preached at the opening of *the Church of Calcutta!*" The main object of this discourse was to set forth the superior excellence of the Presbyterian polity. In the execution of his task, the preacher wholly dropped the question, what form of government was established by the Apostles. He, moreover, contrived almost to identify episcopacy with popery; and did not scruple to represent the Church of England, as still grievously infected with the corruptions of the Church of Rome. Such were the doctrines, for the promulgation of which the Presbyterian minister had the nerve to ask for the pulpit of the cathedral church of Calcutta."

We attempt not to characterize the animus of this extract. It might be sufficient to remark that we cannot see that a vast amount of "*nerve*" was needful to enable one Christian minister to ask of another Christian minister the use of the Church ordinarily occupied by the latter. We have read in that Bible, which both Bishop Middleton and Dr. Bryce recognized as their directory, such passages as these, "Hereby shall all men know that ye are my disciples if ye have love one to another." "Give to him that asketh thee, and from him that would borrow of thee turn not thou away." So we have read, but so read not Bishop Middleton; and *so* reads not Mr. Webb LeBas. Had this been actually the state of the case we could have conceived a man of much less "nerve" than we know Dr. Bryce to be possessed of to have been capable of proffering the request; but when we remember that the Church in question, belonged not to Bishop Middleton but to the Honourable East India Company, who had sent out Dr. Bryce, and had promised to provide him and his congregation with a Church, it appears to us that the case is considerably altered; it is no longer one Christian minister asking another Christian minister for the occasional use of *his* Church, but it is a Chaplain appointed by the East India Company to perform public worship in Calcutta, asking the curator of a building erected by that Company for the purpose of public worship, to be permitted at convenient times to make use of it for that purpose. But even this request it appears Dr. Bryce did not tender by virtue of

his own "nerve." It appears, from his own statement, that he acted throughout by advice of the Deputy Governor. Our next quotation shall be to that effect from a note in Dr. B.'s work on Native Education in India :—

"In the contests referred to in the text, it fell to the lot of the writer of these remarks to take, of necessity, a prominent place, filling, as he then did, the situation of Minister of the Church of Scotland at Calcutta ; and it has since that period been his destiny to have this part very unfairly misrepresented, by no less distinguished a writer than Mr. Le Bas, now at the head of Haileybury College. In his Life of the late Bishop Middleton, Mr. Le Bas has spoken of the Reverend Dr. Bryce, as displaying anything but a courteous spirit and demeanour towards the first Prelate of Calcutta. But he has forgotten to state, that from the Right Reverend Bishop himself came the opposition to privileges, claimed by the Presbyterian body in India, which, it had been, in Dr. Bryce, the most manifest dereliction of duty to have surrendered on the part of the Church which he represented. When Mr. Le Bas dwells on what he paints as the impertinence of the Presbyterian Clergyman, in soliciting the use of the pulpit of St John's Church, until a building could be erected for the Presbyterians at the Presidency of Fort-William, he overlooks—perhaps he was not made acquainted with—the fact, that the request was preferred to the Bishop, at the suggestion of the then acting Head of the Government ; and was only adopted—and that reluctantly—by Dr. Bryce, that he might have no room to allege, that he had neglected any means, however unlikely, that offered for the religious accommodation of his flock. When Mr. Le Bas farther expatiates on the impropriety, if not insult, of Dr. Bryce's soliciting the Bishop's presence at the ceremony of laying the foundation of the Scottish Church at Calcutta, he does him equal, if not still greater injustice, for the request was preferred, not by Dr. Bryce, but by the Countess of London and Moira, who had agreed to honor the ceremony with her presence. The impolicy, the illegality, if Mr. Le Bas will so have it, of the home authorities of India erecting two Ecclesiastical Establishments in our Asiatic dominions, is a question on which a High Churchman may be permitted to expatiate ; but which it is altogether needless now to take up."

During the period that intervened between Dr. Bryce's arrival in Calcutta and the opening of the Scotch Kirk, the congregation were accommodated first in the College Hall, and subsequently in the Exchange Hall. A piece of ground at the West End of the Dharamtala was given by the Government as a site for a Church ; when however the foundation was dug, the Military authorities discovered that it was within the range of the fort guns. As the Government had no fitting piece of ground available they rented the present site of the Church from the Free School at the rate of 800 rupees a month. The foundation stone of the Kirk was laid on the 30th of Nov. 1815, and during the whole course of the building, the Bishop and the Senior Presidency Chaplain strove to throw obstacles in the way. Since they could not prevent the building of a Church, they endeavoured to prevent a steeple being upon it ; we have heard that references were made at every stage of the proceedings to the Court of Directors, and at last, we have been informed that when the erection was finished, the patience of the honorable Court was finished too, and that their last rescript on the subject was to the effect that the gigantic cock which surmounts the steeple should not be gilt!

All this seems very trifling, but so is the course of the straw in the current ; such trifles shew the tendency of things ; and in looking back to these painful and humiliating contendings we cannot but feel that it was a signal blessing that the first Chaplain should have been a man who would thus contend for every tittle of his privileges ; for we

cannot doubt that if he had given in but in a single point, the equali of Scotland's rights to those of England would have been compromise

It has been remarked, that some of the mightiest defenders of th outworks of our holy faith have had but a very meagre view of th doctrines of that faith. We might instance Bishops Warburton an Butler, and the present Archbishop Whately; Archdeacon Paley and D Lardner, Mr. Locke and Mr. Addison. A similar remark might b made in regard to Dr. Bryce. While he contended so zealously, an in our estimation so laudably, for the external privileges of his Churcl it must be admitted that neither his preaching nor the mode in whic he discharged the other branches of his pastoral function was such a either to bring back to the Church of their fathers those who had bee previously worshipping in the English Church, or greatly to benefi those who were brought back. His published sermons may be take as no unfair specimen of his preaching, and the various matters witl which his ever active mind could not refrain from busying itself mus have rendered it well-nigh impossible for him to give due attention t his week-day pastoral duties. This may partly account for the fac stated by Mr. Le Bas, that the opening of the Scotch Kirk did not with draw more than a hundred members from the English communion.

In 1819 Dr. Bryce visited Europe, having received permission t be absent for two years on condition of his providing a substitut during his absence. The substitute was the Rev. Mr. Anderson wh ministered till Nov. 1821, we have heard, with considerable acceptance

When the Company's charter was renewed in 1823, the followin clause was inserted into it; it ought in our estimation to have bee inserted in 1813.

" And be it enacted that of the establishment of Chaplains maintain ed by the said Company at each of the Presidencies of the said territo ries, two Chaplains shall always be members of the Church of Scotland and shall have and receive from the said Company such salary as shal from time to time be allotted to the Military Chaplains at the severa Presidencies."

Dr. James Brown was appointed by the Court of Directors as Junio Chaplain. He was a man the reverse of his colleague in almost ever thing. He was not only a lover of peace but possessed of a peculia sensitiveness. He certainly had not the " nerve" which enabled Dr Bryce to encounter and overcome the opposition that was offered to th first establishment of the Scotch Kirk, but, from all we have heard, h was much better fitted to administer the instructions and consolation of the blessed gospel to a Christian congregation. He was not, how ever, long permitted to labor among his attached people. He went t the Straits for the benefit of his health in the end of 1831 and died a Malacca. A monument in the interior of the Church records his people' estimate of his worth.

During almost the whole of 1832 the congregation of St. Andrew' Church was destitute of a stated pastor, Dr. Bryce having returned t Europe and Dr. Brown having been removed as has been stated b death. Ere this time, however, the Church of Scotland had two mini sters in Calcutta attached to her Mission, and they (Dr. Duff and Mr Mackay) officiated in the Church, we believe at the request of the mem bers of the Congregation, and with the approval of the local government

In October, 1832, Mr. Charles arrived in Calcutta as successor to Dr. Brown, having, as we have heard, been recommended to the appointment by a venerable minister of the Church to whom Lord Glenelg made application.

In 1837, Mr. Meiklejohn was appointed to the junior Chaplaincy. Dr. Charles and he still labor in St. Andrew's Church. We trust none of our readers have any of that prurient taste for personalities that takes delight in discussions of personal peculiarities, the style of gesture or diction of popular preachers, and such like. If any be so unhappily constituted we will not be guilty of pampering their diseased appetites.

We should only state that the interior of the Church is fitted up with excellent taste. It is seated we believe for about 400 persons, and is well suited to the country and climate from the loftiness of the roof and the spaciousness of the accommodation. The pulpit is well placed and we understand that preachers of moderate capacity of voices do not find any difficulty in "filling" it. There are two services on Sunday, and one on Wednesday evening. The sacrament of the Lord's supper is dispensed four times in a year.

Neither shall we venture upon any detail of the recent occurrences in connexion with the Church of Scotland that have caused a disunion of the Members of St. Andrew's congregation. We hold decided views on this important subject which we should neither be afraid nor ashamed to avow on all suitable occasions; but the events in question are as yet too recent to be fitting matters of history. It may be that before this series of sketches be brought to a close, the Free Church may have attained a local habitation, and then we shall not shrink from the task of recording, for the benefit of those who shall make enquiries in after years, the history of those events which have led to its foundation.

EXTRACT OF TEA.

From the Shan country.

[The following letter, addressed to our respected predecessor at the date subjoined to it, was unfortunately mislaid, and has only recently been brought to light, together with the small bottle containing the extract to which the letter refers. In our desire to make the fullest amends for the delay and apparent neglect, we lost no time in subjecting the contents of the bottle to a trial, the result of which was of a very satisfactory nature; unwilling, however, to rely entirely on our own judgment, we were induced to submit a portion of the extract to the critical examination of a gentleman, whose chemical knowledge and long tried judgment in matters of this particular nature were calculated to give us the fullest confidence in the soundness of his opinion. We have much pleasure in appending the observations with which he has favoured us; we are happy to find that he entirely concurs with us in the opinion which we previously entertained that the extract must prove an invaluable acquisition to travellers by sea or by land. We doubt not, but sincerely hope that Captain Warwick will find the speculation a successful one.]—Ed.

To the Editor of the 'India Review.'

My dear Sir,

Per bearer I have the pleasure to forward from Captain W. Warwick, of Moulmein, a phial containing a muster of the Extract or Essence

of Tea brought by that enterprizing gentleman from the Shan country, where it is prepared by the natives as an article of trade, and for home consumption.

I am unable to afford information as to the mode of preparation, but, from the short conversation I had with Captain Warwick on the subject of the Extract itself, I am led to suppose that he has furnished all the particulars that it was in his power to communicate, [illegible] muster of the Extract, to the Calcutta Agricultural Society. [illegible] therefore, chiefly with a view to the article being tested, and receiving such notice as it may merit in the columns of your useful Review that I thus trouble you.

If the musters meet that approval which Captain Warwick anticipates, it is, I believe, his intention to bring the article to public notice as one meriting the patronage of voyagers and travellers, to whom *portability* is so grand an object.

The supply from which the muster was taken, was brought to Moulmein in the natural hollow cylinders of the trunks of the bamboo.

As much extract as will cover the point of a penknife, is, I believe, sufficient to yield a cup of strong tea.

Pray give the Extract a trial and fair report, and oblige,

Your's truly,

NORMAN GRANT.

Calcutta, April 25th, 1842.

MY DEAR MR. EDITOR,

The specimen of the Extract of Tea you sent has been tested by myself and several scientific friends, all of whom agree with me in pronouncing it to be a novelty, differing, however, from many other novel things on account of its promising to become a most valuable article of commerce. I am totally in ignorance as to the locality in which it has been manufactured, or the method by which it had been so highly concentrated, but any one who, like myself, will take the trouble to test its virtues will have no difficulty in arriving at the conclusion which I have come to. The rough metallic taste imparted to the mouth by the introduction of the smallest possible quantity of the extract convinces me that the article has been prepared from the green tea plant; and although I was led to believe from its appearance, taste, &c., that it contained a large quantity of saccharine matter, I am satisfied now that it is free from it. I should say that even a superior extract to that sent, might be prepared by using vacuum pans in the evaporating process, for it is evident that the specimen which I have tasted has been subjected to a much higher temperature than vegetable extracts will bear, without deterioration. One hundred and forty, to two hundred and twelve degrees of Fahrenheit is the range that extracts of this kind should be kept within during the process of manufacture. I am convinced that even Papin's digestor spoils one half of the preparations subjected to its pressure.

The Extract of Tea will be an invaluable thing on the line of march, and I am sure will find a ready sale amongst the Military and Naval services. It only need to be told that the whole of the properties of nine or ten seers of tea can be conveniently carried within the compass of

an eight ounce phial, to ensure a large and rapid sale. The manufacturer might also prepare it so as to contain the necessary quantity of sugar and milk, using the "dried milk" of course, and then travellers might dispense with the cumbrous utensils necessary for the production of a cup of the "refreshing beverage." I have, from the extract you favored me with, produced a most excellent cup of strong tea, by merely pouring boiling water over five grains of the extract, and I have no doubt one-half of that quantity would suit the taste of most people. In conclusion I have only to regret that my time and occupation will not allow of my sending you any chemical information respecting the extract, but I dare say you will be able to get all the necessary pros and cons respecting it, as soon as a short notice of it appears in your valuable Journal.

Your's truly,
AN OLD CHINESE.

PRESERVATION OF SHIP'S MAILS.

LOSS OF THE 'MEMNON.'

To the Editor of the 'India Review.'

SIR,

I think it is greatly to be regretted that some greater precaution is not adopted to prevent, to a certain extent, the loss to which sea sent Mails are more or less exposed by such accidents as that of the "*Memnon.*" When the '*Protector*' went down at the Sand Heads in October, 1838, a considerable quantity of goods was saved by the compact manner in which they had been prepared in cases for the voyage. To the best of my recollection, one bulky case containing Books, and another containing a Picture of considerable size and weight were amongst the floating remnant of the wreck on that melancholy occasion. Cannot means be adopted for rendering the Mail Bags or Boxes impervious to the water and sufficiently buoyant to give a chance of their being picked up?

Surely the expence of effecting this in the way adopted in Life Boats, I mean by the use of hollow copper vessels, could bear so trifling a proportion to the advantage of safety which it would ensure as to be no bar to the adoption of it by our Government. Had this been the case in the loss of the "Memnon," I, in common with hundreds, should not at this time have to lament the loss of valuable documents which I can never get replaced.

The same chance which preserved the lives of so many, might also have preserved the mail boxes. The Bombay Chamber of Commerce which appears to be at all times ready to consider and recommend to the notice of the Government, whatever may appear likely to serve the public good, might I think greatly benefit the public of the Presidencies by the favourable consideration of the hint I have thrown out, or of any plan of a similar kind likely to prevent a recurrence of the loss of

OUR OVERLAND LETTERS.

[We think that there can be but one opinion as to the necessity and advantage of adopting some such means as our correspondent suggests for the preservation of Sea Transit Mails, and we perfectly concur with him in thinking that the Government should be appealed to on the subject. It is to be lamented that matters of this nature should be so tardily taken into consideration, and that not until life and property have been sacrificed to a fearful extent do they appear worthy of the care and attention of the Legislature :—

> " —————— for want of timely care
> Millions have died of medicable wounds."

In the early stage of steam navigation how little precautionary care or attention was bestowed on the probable risks to which human life was exposed,—and how fearful a catalogue of loss and destruction was exhibited ere the evils appeared of sufficient magnitude to demand the interference of the Government for their removal or diminishment. Such evils it was said will effect their own cure—men will grow cautious for their own sakes ; but a thousand frightful facts contradicted the assurance, and whilst men manifestly evinced total indifference or inattention to their own interests and safety, it was vain to suppose that they could be much impressed with any consideration for the hazard to which their temerity might expose the lives and fortunes of others :—the remedy lay not in private hands. Day after day, week after week, had the public press reiterated the crying evil and chronicled the appalling statements of ruin and distress which had resulted from the most heartless carelessness and inattention. Urged at length, the Government enforced its measures for the public safety. One of those to which we may more particularly refer had been repeatedly pointed out to the notice of commanders of Steam Vessels, and urged in vain for their adoption—simply the exhibition of a light at the head or some conspicuous part of the Vessel, at night, as a warning and mark of avoidance :—simple and efficient as this was proved to be in preventing accidents, involving no serious pecuniary outlay or exertion of physical labour, nothing short of the power of the Government—with its denunciatory penalties in terrorem, was sufficient to enforce its adoption either at Sea or on Rivers, where had it been earlier adopted we should not, it is probable, have heard of such appalling accidents as that which

> " When all was mute tranquility"

plunged into eternity at one fell swoop nearly 200 human beings, and involved many hundreds more in misery and ruin. The Mining Journal contains a brief communication from one of its correspondents who thus writes relative to the loss of the Hull and Leith Steamer 'Pegasus' :—

" TO THE EDITOR OF THE MINING JOURNAL.

" SIR,—I entreat your attention to the deplorable catastrophe of the loss of the *Pegasus* steamer, of which I enclose the details. The Paddle-box Life Boats, which take up no additional room, and are immediately available, with a proper supply of Mr. Carte's Safety Belts, or those of Mr. Andrew, would have saved, under Providence, every one of these hapless victims ! Why is the possession of these not made imperative on every steamer, by legislative enactment ? Government seems to be criminally indifferent.

Portland-place, Hull, July 26. J. MURRAY."

To this letter the Editor has appended the following remarks, and in his opinion of the importance of the subject, and the wish he expresses, we most heartily concur.

" [We wish that Mr. Murray, or other philanthropists, would convene a meeting, when a memorial might be drawn up, with the view of directing the attention of Government, or Parliament, to the subject. It is one of so important a nature, that we cannot doubt for a moment, but that even the question of Repeal, or that of the Corn Laws, would be waived in its favour. Nothing but legislative enactment and compulsory measures will effect any good. We hate compulsion, but such becomes indispensable under circumstances of this nature.]"—*Ed. Ind: Rev.*

THE CALCUTTA EARTHQUAKE OF 1737.

To the Editor of the 'India Review.'

Dear Sir,

I am extremely ignorant of the *history* and *topography* of this our City of Palaces, but as I believe that many of my fellow citizens are quite as ignorant, and quite as desirous of gaining that information for which I thirst, I will not trouble you with a long apology for this intrusion on your time and attention, in soliciting for myself and others, from you, or one of your correspondents, the decision of a doubt on a subject of historical interest.

To the subject—In the "Annals of the Mission Church," contained in your last number, it is stated that "the first Church was erected in Calcutta in 1715, about 50 yards distant from the Old Fort, and built at the expence of the Calcutta Merchants and Seamen," and that it "was levelled to the ground by an earthquake in 1737." In confirmation of the last named circumstance I find in the chronological part of the late Mr. J. Prinsep's "Useful Tables" the subjoined item and note :—" 1737. Calcutta nearly destroyed by a hurricane and earthquake.—*E. I. Chron.*

Note. "The following extract is from the *Gentleman's Magazine*, printed in 1738-39. "In the night, between the 11th and 12th October, (1737) there happened a furious hurricane at the mouth of the Ganges, which reached 60 leagues up the river. There was, at the same time, a violent earthquake, which threw down a great many houses along the river side : in Galgotta (i. e. Calcutta) alone, a port belonging to the English, 200 houses were thrown down, and the high and magnificent steeple of the English Church, sunk into the ground without breaking. It is computed that 20,000 ships, barks, sloops, boats, canoes, &c., have been cast away. Of 9 English ships, then in the Ganges, 8 were lost, and most of the crews drowned. Barks of 60 tons were blown two leagues up into land over the tops of high trees : of 4 Dutch ships in the river, 3 were lost with their men and cargoes, 300,000 souls are said to have perished. The water rose 40 feet higher than usual in the Ganges." N. B. the steeple of the Church was described to have been lofty and magnificent, and as constituting, before this period, the chief ornament of the settlement."—*Sketches of Bengal.*

Now, though Mr. Marshman, in his outline "History of Bengal," gives the same account, apparently on the same authority, with the additional information that "These calamities were followed the next year by famine," and that "the Governor of Calcutta came forward and liberally assisted the poor natives," on reference to Mill's "History of British India" (vol. 3 containing the annals of the year 1737), I find not the slightest allusion either to the hurricane or the earthquake ; and the extraordinary circumstance of the total destruction of "the first Church" with a "high and magnificent steeple," forming, at that period, "the chief ornament of the settlement," is consequently, like the legends of the land, passed over in utter silence ! This, I think, should not be : a revolution of nature, like that of the year 1737,

which, as we are informed by Mr. Marshman, induced the Government to remit the rents of the sufferers, to take off the duty on rice, and to buy and distribute a large quantity of food among the most indigent, certainly demands at least a brief record, if not a diffuse relation in the most standard History of the country. The Plague and the Great Fire of London are events as familiar to the readers of English History, as are the Riots and the Treasons in the same city. The Earthquake of Lisbon is an event which no author would omit in a History of Portugal. Why then is the earthquake of Calcutta unnoticed in the most copious History of British India extant? surely local records, official and historical, must exist to confirm or disprove the statement, which, if true, will certainly merit a chapter or section in the future editions of Mr. Mill's History. It is to this subject, therefore, that I desire to direct your attention, or that of some of your correspondents, whose researches may, very probably, bring to public notice interesting, if not important information.

There is an apparent want of harmony between the statement made in your Church "Annals" and that in the "Gentleman's Magazine" which it may be as well to notice. The former merely states that "the Church was levelled to the ground;" the latter that the steeple "sunk into the ground without breaking."

That there was a hurricane in Calcutta, in October, 1737, there can be no doubt. The question to be answered refers to the asserted Earthquake, and the total destruction of a lofty English Church, and this question, I do hope, will receive a full reply in the next issue of your excellent periodical.

Your's faithfully,
H.P.

THE DAGUERREOTYPE.

To the Editor of the 'India Review.'

Sir,

The character of the present times is marked by an apparent realization of all those monstrous conceptions in which our forefathers loved to indulge in their caricatures and works of necromancy. It is not enough that our carriages run without horses—our ships without sails, or that we even project an aërial passage half round the globe, to which sobriety and reality are lent by the passing of a legislative enactment in favor of the inventor, but, without the aid of saint or satan, and without the fear of priest or imp, a man may sell his shadow for a groat, or purchase one to put in his waistcoat pocket as an acceptable present for his lady love! It is not my purpose, however, to comment on these wonderments further than may serve as a fitting apostrophe to my more sober theme, and upon which, without further flourish, I beg at once to enter.

I have lately been afforded an opportunity of inspecting some very excellent specimens of this modern wonder the Daguerreotype, taken

by a gentleman of Calcutta, whose industry and zeal have been rewarded by the most marked success.

Being something of a dabler in pictures myself, and interested in the marvel workings of Daguerre's extraordinary invention, I was led to remark some peculiarities which a comparison of these specimens, taken from *the life* and *from paintings*, brought to my notice, and which I am induced to throw together, in the form of a few notes under the impression that they may not be uninteresting to yourself and some of your readers.

If the Limner, with the aid of his most charming tints, his choice of light, shade and reflects, has so often, and for ages past, failed to please where he has failed to flatter, it is not very surprising that the "leaden likenesses" as they are called, these too faithful transcripts of all natures imperfections, are neither much sought for nor admired by the ladies, or individuals who are not gifted with features of the most approved contour, or complexions and skins of the most marble smoothness and delicacy. It is one object of this letter, however, to shew that such persons need not be deprived altogether of the advantages offered by the Daguerreotype for, at least, the multiplication of likenesses where an approved one is in existence, and so save themselves some expense, and the artist that which I believe is at all times his abhorence—the labour of *copying*.

I am the more induced to trouble you with this communication because I do not think it is generally known or understood that the Daguerreotype offers so efficient and successful a means of producing very beautiful copies from paintings of a particular character, and of which the specimen now before me is a remarkable example.

In Daguerreotypes taken from the life I have generally—nay, almost always, observed an appearance of much greater age than in the original, a coarseness, darkness, deadness, and—as correctly remarked by a writer in your April Journal—a want of reflected lights, so particularly observable in the lips, as to produce that appearance of coarseness in the mouth presented in the nursery heroes of Mr. Hood's "*Infantry at mess*," or which you may remember oft to have seen in the companions of your boyhood who had been over indulging in "black heart cherries!"

In the plate before me there is nothing of this; and though, as it is the *copy* of a painting, my observation may appear a truism of simplicity to excite a smile, yet the process by which this superiority of effect is gained offers some little matters not unworthy of observation; more particularly as it is not every painting, however approved, which would answer the purpose, or produce, in short, a *copy of itself at all:* but of this anon.

The impression which is produced upon a Daguerreotype would appear to be caused by the *light* portions of the object presented for the operation, the *dark* parts being represented by the polished surface of the plate remaining unaffected, or nearly so, by the process.

Now it may be observed that the degree of dark thus remaining in a picture depends, not on the nature of the colour, but on what I believe painters term its *tone*, that is, its degree or depth; I am led to suspect that what may be termed the character of the colour in respect to *warmth* or *coldness* or *luminosity*, has also its influence, but I ven-

ture this only as a surmise. In proof, however, of what I have here first advanced respecting the *degree* of colour, independently of its nature, I may instance the plate which is now before me.—There is an officer in uniform of scarlet coat, dark blue trowsers, and gold epaulettes. Here, the *colour* of the epaulettes being the lightest, it might naturally be supposed they would so appear in the plate, but this is not the case. They are *darker* by far than even the blue trowsers, in which also the gold stripes down the sides, except in the highest lights, have amalgamated with the general tint.

Let us now compare the operations of the Daguerreotist and the Painter. To produce an effective plate the former is compelled to place his sitter in a powerful light.—Mark the effect. Alas! how every ravage of time, of fell disease, or the canker worm of care, stands out in bold relief to the too sensitive silver or its coat of iodine. The shadows, too—they are strictly natures shadows during a shower of rain, *darkness without colour*; whilst the reflects, those invaluable adjuncts to the painters means, are almost lost in the general glare. If the face be very fair, and the light sufficiently strong, the contrast with the dark, both of the shadows and hair, which shows yet darker, is too strong; it is unearthly, and if the complexion is healthy and ruddy it assumes, on the other hand, the appearance of darkness. Thus, a healthy warm skinned European might appear of darker hue than an Asiatic.

The stronger the light, however, on the sitter, the fairer the complexion;—but observe the immediate consequences of an increase of light;—mark the knitted brow and half closed blinking eyes, and little wonder is it that the sitter in the picture looks so excessively glum or so out of temper!—all of course, particularly with the ladies, so unnatural! I do not know what improvements may lately have taken place in respect to this difficulty, but I find in the year 1840, a suggested improvement in Daguerreotyping by M. Jobard of Brussels, which I here beg to subjoin:—

> "Paint in dead white the face of the patient: (!) powder his hair, and fix the back of his head between two or three planks, solidly attached to the back of an arm chair, and wound up with screws! *The colour of the flesh not reflecting sufficiently the rays of light, would require a powerful sun*, whereas a whitened face will be produced as well as plaster figures by diffused light."—*Mag. of Science.*

If a "*patient*" could endure this and retain a serious expression of face for even 30 seconds, I think he would deserve some credit; but however, the latter portion, which I have italicized, offers some explanation of what I have said respecting the complexion.

Thus much for the Daguerreotist. The painter, who has made the "lighting of his subject" the study of years of his life, places his sitter in a subdued and carefully directed light—suited to the character of the head before him, and fifty stratagems are had recourse to for the purpose of effecting certain desirable appearances of his subject;—and pray, I would ask, is this *less* Nature because she is viewed under her most acceptable garb—her most pleasing appearance?—No more so than her mountains, her lakes, her forests, and glaciers are less so when illumined by the splendour of a rising sun, or tinted with the gorgeous colours of his setting, instead of saddened by the gathering sable of the storm. I say this for those sticklers who I have often

heard aver that artists flattered their sitters, although they have at the same time been under the necessity of acknowledging the unmistakeable resemblance of the picture.

Take now this painting (which, be it remembered, I have supposed is in water colours) with its transparent shadows, its smoothened surface, its subdued light and colouring, and subject it to the Daguerreotype. Take it into the blazing sun of noon, and there is no bringing forth latent imperfections,—no deepening of shadows (which on the contrary are rendered lighter) no pursing of the brows, or winking of the eyes. There is, in short, no change, and all the delicacy and softness which characterized the painting is preserved in the Daguerreotype, lacking, in short, only colour, and resembling a very exquisite *Mezzotinto engraving*.

If we now substitute an oil colour painting in place of the water colour, the result will, I believe, be a failure. This, however, must depend on its style, which if *light* may be successful, but if deep and high coloured, as most oil portraits are, the effect of the Daguerreotype would, and I believe has been, a coarse, black, offensive, and unnatural production.

There is one peculiarity in the Daguerreotype which I would notice ere closing. In doing so I venture to place myself at issue with the writer of an article in the Magazine of Science, who says that in the Daguerreotype "every object is seen in true geometrical perspective." This, under correction,—as far as my own observation has extended, and I have seen one or two very fine specimens from Europe as well as many here—I beg to deny. In all which I have yet seen, as taken from the life, the hands, when resting, as is often the case, on the arm of the chair, and in front or advance of the figure, have appeared *disproportionately large.* According to the common laws of Perspective every object as it approaches towards the spectator must appear, in however delicate a degree, on an increased scale, but in the Daguerreotype this effect appears to me magnified, as in the old mirrors, to an unnatural extent. I imagine this is caused by the nature of the glasses used in the instrument, and may have been an accidental defect, but whatever the *cause* I would advise the Ladies who desire to sit for their pictures in silver to avoid the *effect* by keeping their hands on a parallel with their persons.

Yours faithfully,

UMBRA.

THE ANCIENT CITY OF GOUR.

To the Editor of the 'India Review.'

SIR,

Gour, the ancient capital of Bengal, like Babylon, Palmyra, &c. has passed away, it is now only the abode of the snake, jackal and tiger, and so overgrown with jungle as to render access almost impossible.

I send you the latest notice of its ruins as detailed in a work now very scarce, the '*Friend of India*' for *1818*. It deserves preservation as a valuable document connected with the ancient history of this country.

Yours faithfully,

A. B.

The Ruins of Gour.

The ancient city Gour, said by Dow and Rennell to have been the capital of Bengal 750 years before the commencement of the Christian æra, stood on the left or the east bank of the Ganges, about twenty-five miles below Rajmahl. It lies in N. Lat. 24° 53. and in E. Long. 88° 14 ; and is supposed by Rennell and others to be the *Gangia regia* of Ptolemy. It has borne various names ; it was formerly called *Lucknouti* (Lukshma-vutee), as well as Gour ; and when repaired and beautified in 1575 by the great Ackbar, who is said to have been particularly attached to this city, it received from him the name of Junnutabad, from his fancying it a kind of terrestrial paradise. It is now so completely in ruins that scarcely a single edifice remains complete ; the bats and owls which take refuge in its mouldering ruins, and the alligators which fill its numerous pools, in addition to the wild beasts of the desert, forming almost the whole of its inhabitants. Its ruins, however, are highly interesting to those who delight in tracing the vicissitudes of kingdoms and empires, and bear sufficient testimony to its ancient greatness. The late Mr. Henry Creighton, who resided for many years within a few paces of what, he after the maturest investigation, deemed its North Gate, devoted much time to the examination of its ancient scite and boundaries ; and in a course of years, not only drew a map of the city itself with its suburbs and boundaries ; but took views of its majestic ruins when they were in a far higher state of preservation than they are at present. Some of these have been engraved in Europe, and have, we believe reached Calcutta.

The kindness of Mr. Ellerton, the surviving friend of Mr. Creighton, and his companion in his frequent excursions to those ruins, has indulged us with a view of this map, as well as furnished us with many particulars which occurred to Mr. Creighton and himself, while in the habit of visiting and contemplating these majestic remains, which enables us to lay before our readers the following brief account of the boundaries and extent of Gour ; while a recent excursion thither by a friend, enables us to add some few particulars relative to such of those ruins as the hand of time has not as yet consigned to indistinguishable oblivion.

From the most accurate observation, it appears that the city of Gour, independently of its suburbs, extended in length from north to south little less than seven miles ; there being strong reason to believe, that the scite of the north gate was within a few yards of Mr. Creighton's house at Goamaltee, and the south gate way of the city being now in existence at Kutwalee, about seven miles distant from thence, of the present state of which gate some account will be subjoined. The suburbs however extended much farther, there being sufficient vestiges of them to be traced at least to a distance of three miles from each of those gates, so that Major Rennell's conclusion seems quite within the bounds of probability, "Taking the extent of the ruins of Gour at the most reasonable calculation, it is not less than fifteen miles in length extending along the old bank of the Ganges."

The breadth of this ancient city was not however equal to its length. Its ruins discover vestiges of its being in general about two miles in breadth ; and in no part exceeding three. But this breadth, united with its length, must have contained an immense mass of population. The city itself, exclusive of its suburbs, must have included full seventeen square miles, which, if we exclude the suburbs of Calcutta, will amount to above thrice the space occupied by the present metropolis of India ; and if Gour and its suburbs occupied fifteen miles in length, and four in breadth, which allows the suburbs on the east and the west to extend only a mile each way, the whole of its population must have covered a space of nearly sixty square miles ; while Calcutta, with its suburbs can scarcely be computed at more than fifteen. The population therefore, if that of Calcutta be accurately estimated at five hundred thousand, might have been nearly two millions ; but if we allow it to be only two-thirds as populous

as Calcutta, its inhabitants must have exceeded a million three hundred thousand, a far greater mass of population than is to be found in any one capital now existing in Europe, the population of London which exceeds that of Paris, and consequently of every other city in Europe, scarcely amounting to a million.

Should it be objected, that such a mass of population in an inland city is almost incredible, it should be considered, that this city formed the capital of Bengal and Bahar, in the centre of which it is situated, the utmost boundaries both of Bengal and Bahar being scarcely three hundred miles distant from it on any side. The population of these two provinces at present, probably exceeds that of any former period, there being scarcely any period to be traced in Indian history wherein these provinces have so long enjoyed the blessings of peace alike undisturbed by outward invasion and intestine commotion, as within these last sixty years, and certainly none wherein security for person and property has been enjoyed in such a degree. But if instead of thirty millions, the present estimated population of these provinces, we reckon it at twenty millions, this will be quite enough to allow for a million three hundred thousand of this mass being collected in an eastern capital, particularly one on the banks of that noble river which ran nearly a thousand miles from its source before it could reach Gour, and three hundred afterwards before it reached the sea.

In the midst of this city stood a Fort, nearly square, and extending about a mile on every side. The ruins of this Fort at the present moment sufficiently mark both its scite and its extent. The ramparts now remaining are in some places full sixty feet high, and have widely branching trees growing on the very summit of them. Within this Fort, there is a wall now remaining, nearly a quarter of a mile in extent, and in some places between seventy and eighty feet in height. Opinion is divided respecting this building, whether it inclosed a Hindoo temple, or a royal palace. The latter opinion however seems by far the most probable; for, not to say that all the other ruins in any degree of preservation, are evidently of Mussulman origin, the length of this wall almost precludes the idea of its being the inclosure of a Hindoo temple; few temples in India have ever required an enclosure the side of which must have been full a quarter of a mile in extent; and still less one the wall of which must have been seventy feet high, and might possibly have been ninety or a hundred. With the idea of an eastern palace however, these dimensions well agree, particularly of a palace in such a capital as Gour must have been. It seems therefore by far the most probable opinion that this was formerly a royal palace. We now add a few observations on the ruins which still remain sufficiently entire for inspection, communicated by a friend who lately visited them, which we give in his own words.

Excursion to the Ruins of Gour.

"Being on a visit at Mr. E.'s the residence of the late Mr. Creighton, and consequently on the spot where that indefatigable antiquary, deemed the city of Gour to have stood, we felt a strong wish to take a view of such of its ruins as still remain. Accordingly nine of us, three ladies two gentlemen, and four children, having procured an elephant and a sufficient number of palanquines, left the house about ten, and proceeded first to what is termed by the natives,

The great Golden Mosque,

where we arrived about eleven, and there found our esteemed friend Mr. A. who, hearing of our intention, had arrived on horseback from Chandnee, about an hour before. This noble building appears to have stood nearly in the centre of this ancient capital. It was built of brick; but it was ornamented on the outside with a kind of black porphyry, which almost covered the walls, of which only a small part now remains, this with other ruins, having for ages formed the quarry whence every one near who wished marble for a floor, a chimney piece, &c. has furnished himself *ad libitum*; even the Cathedral Church of Calcutta being, at its erection, indebted to these venerable ruins, which have also originated many of the monuments in the cemeteries at Calcutta. The walls of the building are now stripped of their stone covering in many places, but the building itself seems equally firm, the stone covering appearing to have been wholly ornamental This Mosque appears to have been surrounded with a wall, which on the east side of the building formed a court, about 300 feet in length, and 250 in breadth. The Mosque itself, formed a building a hundred and seventy feet in length from

north to south, and a hundred and thirty in breadth. These dimensions are easily ascertained, as the north and south doors of the mosque which mark its length, remain entire; and the breadth is easily computed from the one range and the ruins of the rest, which yet remain. Its height within, is about sixty feet; but it is probable that the spires of its lofty domes rose to the height of a hundred feet from the ground.

Its internal structure presents a singular appearance. It evidently contained no one space of even fifteen feet square, its breadth is divided into six ranges, somewhat resembling the aisles of an ancient church in England of Gothic structure. These aisles are in breadth twelve feet; and as they extend the whole length of the building, from north to south, they are somewhat better than a hundred and fifty feet in length. The six walls which once divided them and supported the roof, were eight feet in thickness, being built of brick and covered with black porphyry to a considerable height. These ranges or aisles were not formed of solid masonry, however, each of them was intersected by eleven openings from east to west, of somewhat more than six feet in breadth. This in reality divided the wall which supports the roof of each range, into twelve massy columns of eight feet square; so that the whole building contained seventy-two of these columns eight feet both in length and breadth; of which the six outer ones on the two sides north and south adhering to the outside wall, left sixty within to support the roof. These rows of columns closed over each aisle, and thus formed six semi-circular roofs, covering and extending the whole length of each aisle. It was however only that part furnished by each column which formed the arches of these six semi-circular roofs; the eleven spaces which intersect each range, were formed above into domes, about eleven feet in diameter within, and terminating in a point without. Thus the roof when entire rose in sixty lofty spires, ten standing in each row from north to south; which if gilt and ornamented as they are in other Mussulman capitals, like those at Moorshedabad for instance, must have presented a most superb spectacle in the midst of this capital. Of these six ranges or aisles, only one, that on the east side, is now entire, although traces of the other five are still visible. Of the domes in this range, the roofs of five are entire, those of two more are merely open at the top, in three more the roof is entirely fallen in, and that on the rest being half fallen, seem to menace the spectator with instant destruction, should any part of mouldering ruin fall while he is walking underneath. The outward walls are nine feet in thickness; they are built with small bricks extremely hard, and with excellent cement. The whole building seems to have suffered far less from depredation, than from the numerous shrubs and trees which grow upon it, and which insinuating their roots into the breeches of the walls, threaten the whole with unavoidable and speedy dissolution.

(To be Continued.)

REVIEW.

Human Foot-prints in Solid Limestone.

We have just received three numbers of the "American Journal of Science and Arts," an excellent publication conducted by Professor Silliman and Benjamin Silliman, junior. They contain a vast variety of articles, many of which are far above mediocrity; to one of them we purpose, in a short article, to direct our readers' attention, and to make some remarks regarding the highly interesting subject to which it refers. It is entitled "*Regarding Human foot-prints in solid limestone*; *by David Dale Owen, M. D. of Indiana, with a plate.*" Dr. Owen, we may remark, is the grandson of David Dale, whose name and character are not unknown to our Scotch readers, and the son of Robert Owen, of far more extensive though far less enviable notoriety.

We shall first of all give a very short abstract of the article, and then make some observations on the bearing in a geological point of view of the facts attested by Dr. Owen. In the bed of the Mississippi at the Town of St. Louis there was a limestone rock visible at the extreme subsidence of the river, so as to be seen on an average about once in ten years. On this rock were imprints of two human feet, clearly and distinctly marked. A mass of the rock containing the foot-prints was quarried in 1819, and became the property of Mr. Frederic Rapp, by whom it was sold along with the estate of New Harmony to Mr. Robert Owen, and is now in the possession of Dr. D. D. Owen, the author of the memoir before us. Two questions at once arise with respect to this interesting stone. *First*, what is the age of the stone, or to what geological period does it belong? and *secondly* what is the origin of the foot-marks, are they natural or artificial? Are they of a geological or an artistical character? As to the first question the marine remains discovered in the rock itself leave no doubt. The shells at once identify the rock with that which according to Dr. Owen lies from ten to twenty feet below the coal-measures of Indiana, Illinois and Kentucky, and which is acknowledged to be identical with the mountain limestone of Europe. This being the answer to the first question—such of our readers as know even the first principles of geological science will perceive that the answer of the second becomes a matter of intense anxiety. Were there men upon the earth at the period when *this* rock was formed? An affirmative answer to this question would very materially unsettle the geological faith of multitudes, and probably produce still worse effects, as will appear in the sequel.

The question has been answered differently by different observers. "Mr. Schoolcroft, who first introduced the matter to the scientific world, expresses his unqualified conviction that they are true fossils, the actual impression of the men's feet made in the rock at some remote period when it was soft enough to receive them." "Col. Benton entertains a different opinion, and supposes them to be the result of human labor, at the same period of time when those enigmatical mounds upon the American bottom and above the Town of St. Louis were constructed." Mantell, the English geologist, believes the foot-prints to be of a truly fossil character; but he had never seen them, and supposes the rock containing them to be a Sandstone; high as in his character therefore as a geologist, his opinion on this point must go for nothing. Dr. Owen gives his opinion in favour of the artificial character of the footmarks.

It will be needful for us to examine in detail the reasons offered in support of these contradictory opinions. On the one hand it is asserted that the marks are perfectly natural in their appearance, and that the first sculptor of the present day could not produce any thing so exquisite. How then could they be produced by the American Indians without iron tools, and without an accurate knowledge of the structure of the human frame? On the other hand, it is argued that the uniqueness of the specimen, and the ascertained absence of all other footsteps leading to the place where those in question were *in situ*, render it exceedingly improbable that these marks are natural in their origin, while it is declared that the intaglios do not discover more artistical skill than was required for the production of the arrow-

heads which we know to have been manufactured by the North American Indians at a very remote period. The first of these objections we reckon well-nigh insuperable. There is probably no rock more thoroughly known than the mountain-limestone of Europe. It has been quarried for centuries, and attention has been closely directed for at least one century to the vast variety of fossils that it contains. Since then there has not been a single vestige of human remains discovered in all the millions of millions of tons that have been quarried, we have a strong presumption against any being found, a presumption fully warranted by the principles of sound inductive philosophy, and which no *solitary instance*, if it can be accounted for in any other way, will be sufficient to remove. The only instance of human remains found in limestone at all occurs on the shore of Guadaloupe, and the stone in which they occur is of quite recent consolidation. On this point Dr. Buckland says in his Bridgewater Treatise, "The most remarkable and only recorded case of human skeletons imbedded in a solid limestone rock is that on the shore of Guadaloupe. There is however no reason to consider these bones to be of high antiquity, as the rock in which they occur is of very recent formation, and is composed of agglutinated fragments of shells and corals which inhabit the adjacent water. Such kind of stone is frequently formed in a few years from sand banks composed of similar materials on the shores of tropical seas."

From this quotation it will be clearly seen that the Guadaloupe fossils and these are of entirely different quality. If these be genuine fossils they are solitary instances ; and we think it may well be maintained that in a question of so great moment a single instance, if it were not so "glaring" as to be quite irrefragable, ought not to be received in evidence. Let us just see what are the probabilities against it. The limestone in which the impressions occur, is, according to Dr. Owen, of the same order with the mountain limestone of Europe. Now, on referring to Dr. Buckland's Geological chart, we find that the mountain limestone is overlaid by the "coal formation," the "new red conglomerate," "Magnesian limestone," "variegated marl," "lias," "oolite" and "chalk," all secondary, besides the tertiary and diluvial formations. In all these there is no vestige found of man or his works ; although, besides the natural exposure of them by cliffs and precipices, they have been dug and examined in every direction in connexion with the mining operations of Europe. Now, we would ask, is it conceivable that human remains should not occur in any one of all these formations, had man been on the earth at and ever since the period of the formation of the mountain limestone? The spirit of true inductive philosophy would justify us in requiring very strong evidence before we could admit any thing so improbable. But this we must admit, if we receive these foot-marks as genuine organic traces made on the rock at the period of its consolidation. In fact, we apprehend that we should be justified in denying their genuineness as organic remains if we could find any other way not *very* improbable of accounting for their existence.

Is it possible then, is the next question, that the foot-prints have been carved out by man after the rock was solidified? Dr. Mantell says that they are equal in skill and fidelity of execution to any thing that

Sir Francis Chantrey could have executed, and thence concludes at once that the American Indians could not possibly have produced them. It must be observed, however, that Dr. M. had never seen them, and probably took his account of their beauty from Mr. Schoolcraft. Now we all know how easy it is for any one to persuade himself in a matter of this kind of the superlative excellence of any such thing. We remember being told by a friend that he once found himself in a little dark dirty apartment in one of the great pyramids of Egypt, in company with a young traveller who had come with the evident determination to be enraptured with the greatness and grandeur of every thing connected with the wonderful fabric. Our friend, with well assumed gravity, began to descant in hyperbolic strains on the magnificence of the apartment in which they were. (It was little superior to an ordinary dog-kennel). "What, said he is all the pillared gorgeousness of Grecian architecture ! What even the fretted arches of the venerable Gothic ! What in comparison with the simple dignity of this wondrous hall ! Here is the very embodiment of the *beau ideal* of simple magnificence; the very prototype of the noblest conceptions of man." At the beginning of this declamation the poor youth looked in blank bewilderment, but he soon found that this was the very impression that he *expected* to be made on his mind by this time-honored structure. At the conclusion he admitted that it was even so ; and we doubt not that with perfect conscientiousness he entered into his journal a statement of the overpowering impression made on his mind by this most magnificent of all human conceptions. Now in like manner, without imputing to Mr. Schoolcraft anything but perfect good faith, we may easily suppose that his own mind practised upon itself a similar deception to that which our friend assisted his young fellow traveller in practising upon himself. Mr. Schoolcraft was the first who introduced these marks to the notice of the scientific world, and there is nothing in the world more natural than that he should with the most perfect good faith be insensibly and unconsciously led vastly to exaggerate their excellency. Dr. Owen must be admitted as unexceptionable evidence on this point. Hear then what he says :—

"—Not doubting that Mr. Schoolcraft sought faithfully to embody the impressions made upon him by the appearance of the phenomenon, yet I must be permitted to remark, that I am unable fully to endorse the unqualified expressions of admiration in regard to the matchless workmanship and inimitable fidelity of execution which the inspection of these foot-prints has called forth in various quarters. I may be supposed to regard the specimen which is the subject of these eulogiums, certainly with no unfavorable eyes. To find myself the possessor of a fossil unique in the cabinets of Europe or America, or even of a specimen of aboriginal sculpture that should put to shame the best efforts of Chantrey's chisel, was a prospect calculated to quicken my perceptions of its merits and beauties, or to bias my judgment in favor of its genuine character. Nevertheless, after the most critical inspection, I regret to be impelled to the confession, that I see no incredible display of anatomical knowledge or artistical skill ; nothing more than we may fairly attribute to the observant and ingenious Indian, dependent for his very life, as the forest warrior daily is, on an intimate and familiar acquaintance with tracks of every description, and more especially with those of his own race. The representation is, indeed, easy and natural ; at the heel, at the ball of the foot, at the outer edge of the sole opposite the instep, the impression of the muscular elevation is given with fidelity, yet without any delicate details, minute lines of demarcation between the muscles, flexures of the skin, or similar minutiæ."

In another passage Dr. Owen declares that he has in his possession an

axe wrought out of a harder rock than that in which the foot-marks occur, the unquestionable work of the North American Indians, which has actually as fine or a finer finish than the foot-marks in question.

For ourselves we care little about the decision of the question as to the beauty of the impression, as we do not think it makes much for the decision of the main point in one way or other. If the impression had been made in the rock while in a viscous state it must have been consolidated very speedily, else the exactness of the imprint would soon have been diminished; now, in so speedy a process of consolidation, we believe that it was scarcely possible that the proportion of the marks should not have been marred. Let any one look at the impressions of the footmarks in clay after it is hardened by the heat of the sun, and we believe he will not find that they are very accurate: or let him look at the organic remains of the tracks of birds or beasts which every museum contains, and he will not find them superior as representations of the feet by which they were made to those that a school boy can make with the point of a stick in the clay. We hold therefore that if Mr. Schoolcraft's account of the excellence of the intaglio be received in the letter, it will militate as much against their organic as against their artistic origin. We have then not the slightest doubt remaining in our own mind, that the marks were made by the Indians to record the fact of one of them having stood on a part of the rock that probably had never been seen uncovered before, just as Joshua by the command of God recorded by a perpetual monument the miraculous drying up of the waters of the Jordan, and the standing of the priests of God in the middle of the water-course.

As there are probably many of our readers who cannot appreciate the importance of such an apparently trifling matter as the marks of a man's foot on a stone, we shall, in vindication of ourselves for having devoted so much of our space to the subject, append a simple statement of the conclusion to which we would lead them. It is with us matter not only of historical but still more of religious faith that man has not existed on the earth for so long a period as 6,000 years, and that he did not exist at the period of the formation of the solid materials of the earth. If, however, on the apparently unexceptionable testimony of Mr. Schoolcraft we had admitted these footmarks to have been produced by the impress of human feet at the period when the rock was in a viscous state, our faith in those heavenly records which narrate to us the history of man's creation could not have failed to be shaken. The conclusion therefore is, that we ought not hastily to admit any geological phenomenon, however apparently well attested, to militate against the inspired records of creation. Had this simple rule been attended to, (and it is a rule most strictly in accordance with the *theory* at least of modern philosophy) how many humiliating displays should we have been spared of the ignorance and imbecility of man! We fear not for the stability of the inspired records of our faith. They are pure truth, and all other truth must agree with them;—but we do deprecate the practice of those who will permit the unformed theories of philosophers to shake their confidence in these unassailable monuments of God's mercy and compassion towards the creatures of his hand, instead of patiently waiting until crude theories be purified and consolidated into unquestionable verities, which have always hitherto corresponded

and always henceforth will correspond with or at least not contravene the oracles of God.

We conclude with a quotation, whose authorship we need scarcely disclose, for who could have written the following but Dr. Chalmers?

"All must be aware of a certain rampant infidelity that is now abroad, which, if neither so cultured nor so profound as in the days of our forefathers, is still unquelled and resolute as ever; and is now making fearful havoc, both among the disciples of the other learned professions, and among the half educated classes of British society. The truth is, that infidelity, foiled in its repeated attacks on the main citadel of the Christian argument, now seeks for auxiliaries from every quarter however remote of human speculation. There is not perhaps one of the sciences which has not, at some time or other, been pressed into the service; and the mischief is, that, in very proportion to their ignorance of these sciences, might the faith of men be unsettled by the imagination of a certain wizard power, that each of them, on the authority of some great infidel name, has been said to possess—a power, not only to cast obscuration over the truth of Christianity, but bid the visionary fiction altogether away into the shades from which it had been conjured. And accordingly, at one time there arose Geology from the depths of the earth, and entered into combat with a revelation, which, pillared on the evidence of history, has withstood the onset. At another, from the altitudes of the upper firmament was Astronomy brought down, and placed in hostile array against the records of our faith; and this assault also has proved, powerless as the former. Then, from the mysteries of the human spirit has it been attempted to educe some discovery of wondrous spell by which to disenchant the world of its confidence in the gospel of Jesus Christ; and many an argument of metaphysic form has been taken from this department of philosophy, to discredit both the contents and the credentials of that wondrous manifestation; and these have been successively, though perhaps not yet fully or finally, disposed of. Even, in quest of argument by which to prop the cause of infidelity or to find some new plausibility in its favour, the recesses of physiology have been explored; and from Lecture-rooms of Anatomy, both in London and elsewhere, have the lessons of materialism been given, and that to the conclusion of putting a mockery on all religion, and if possible expelling it from the face of the earth. But perhaps the most singular attempt to graft infidelity on any thing called a science, is by those who associate their denial of the Christian Revelation with the doctrines of Phrenology—as if there were any earthly connexion between the form of the human skull, or its effect upon the human character upon the one hand, and the truth or falsehood of our religion upon the other. * * *

Nor are we aware of a single science in the vast encyclopedia of human knowledge, which has not, in some shape or other, been turned, by one or more of its perverse disciples, into an instrument of hostility against the Gospel of Jesus Christ. Nevertheless it too has an evidence of its own, alike unassailable and beyond the reach of violence from without. It is not by the hammer of the mineralogist, that this evidence can be broken. It is not by the telescope of the astronomer that we can be made to descry in it any character of falsehood. It is not by the knife of the anatomist, that we can find our way to the alleged rottenness whch lies at its core. Most ridiculous of all, it is not by his recently invented cranioscope, that the phrenologist can take the dimensions of it and find them to be utterly awanting. And lastly, may it be shown, that it is not by a dissecting metaphysics, that the philosopher of the human mind can probe his way to the secret of its insufficiency; and make exposure to the world of the yet unknown flaw, which incurably vitiates and so irreparably condemns either the proofs or the subject-matter of the Christian faith. All these sciences have, at one time or other, cast their missiles at the stately fabric of our Christian philosophy and erudition; but they have fallen impotent at its base. They have offered insult but done no injury, save to the defenceless youth whose principles they have subverted, or to those men of ambitious vanity yet imperfect education whose little learning is a dangerous thing. If pedantry be defined the untimely introduction of science, with its imposing nomenclature, either into companies that cannot understand it, or into subjects where it is wholly inapplicable, then is this the most mischievous and unfeeling of all pedantry. It were well to expose it and disarm it of its

power over the imaginations of ignorance—to prove that Theology has an independent domain of her own, where, safe in her own inherent strength and in the munitions by which she is surrounded, she can afford to be at peace with her neighbours, and, free from all apprehension or envy, can rejoice in the prosperity of all the sciences."—*Chalmer's Works, vol. v. Preface.*

SELECTIONS FROM BRITISH AND OTHER PERIODICALS.

DESCRIPTION AND SPECIFICATION OF THE MATERIALS &C OF A SUSPENSION BRIDGE ERECTED IN THE WINTER OF 1842 AT BALLOCH FERRY, DUMBARTONSHIRE, FOR SIR JAMES COLQUOHAUN, BART. BY MR. JAMES DREDGE.

[Plate 22.] Fig. 1. Represents a longitudinal elevation of the bridge.

Fig. 2. The plan.

Fig. 3. An enlarged longitudinal section of the platform.

Fig. 4. A transverse elevation of the towers with section of the roadway; also showing the formation of the suspending chains.

Fig. 5. A transverse section of the platform.

Fig. 6. A plan of the main suspending chain, showing the construction of the joints, and the mode of tapering or reducing towards the centre.

[The same letters refer to the same part in each figure.]

The total length of the suspended roadway is 292 feet; but, as a space of 46 feet is left on the outside of each of the towers, the centre span is reduced to 200 feet. The height of the towers for supporting the chains, above the roadway, is 21 ft., which is equal to the *versed sine*, or deflection of the chains.

A B A, the main chain of support; *c c c*, &c., the oblique rods, to sustain the platform, and connect it with the chains at the joints, *b b b*, &c. The mode of fastening the lower ends to the platform is seen on a larger scale in figs. 3 and 5, where the oblique, rods *c c*, pass through the circular castings E E, and are secured on the under side by a nut and screw; these circular cast plates are firmly fastened to the beams, D D, which pass throughout from end to end, one on each side of the bridge; to these beams all the oblique rods to convey the weight to the chains are attached also, by means of the cast boxes, F F, &c., the transverse wrought-iron joists or beams (one is seen in fig. 5, marked G) which pass under at right angles, and immediately support the platform, are connected. These beams are 2ft. 3 in. apart; every third beam is trussed with a suspension truss, in the manner shown in fig. 5—that is, by bringing the tension-bars, I I I, beneath the platform, and jointing them at the points, H H, where the beams, H and H, which pass under and about the transverse joist, G, rest. One of these is seen in longitudinal section, fig. 3. and both are marked out transversely in fig. 5; they run parallel with the beams, D D, the whole length of the bridge, and are very serviceable in strengthening the roadway transversely, as they support the joists, G, at two intermediate points, and thereby reduce the length between the bearings from 20 feet (the whole width of the roadway) to 6ft. 8in. All along the neutral line of the transverse beams, about six inches asunder, are 11-16ths holes punched, through which 5-8ths rods pass, and run parallel from end to end of the bridge. It has been stated above that there is an opening of 46 feet on the outside of each of the towers, the platform here is attached to the chains, and supported in precisely the same manner as in the centre span, just described. The back or mooring chains A C, for securing the bridge, are carried to the same distance as A B over the stream, and, from the extremity of the chain at C to the centre of the tower, is just 100 feet, equal to one-half the span of the bridge. If 46 feet (the length of the suspended roadway between the towers and the embankment-wall) be deducted from 100, it will leave 54 feet the distance which the mooring chains extend on the land; in this 54 feet there are fifteen oblique rods to each chain, and every one of them secured to large blocks of stone, firmly embedded in the masonry, and, as there are four chains in all, there are, consequently, sixty points thus fixed. The oblique rods are carried out in the same way, and in the same angles, in the back stay chains, as in the bridge over the stream; therefore, each of them that are fixed in the ground, from acting in a diagonal direction, assist in supporting the bridge, so that, independent of the opening, which balance 92 feet, there are sixty points at which the

mooring chains are attached, to secure the safety of the bridge. The railing is made as shown in the drawing, having cast standards fixed at every other beam and wrought iron three-quarter bars passing through them.

SPECIFICATION OF MATERIALS, &c. The length of centre span has been stated above to be equal to 200 feet, and the roadway on the out side of each tower is suspended to the extent of 46 feet; the breadth of the platform is 20 feet. Each pier for supporting the chains consists of two octagonal towers of Masonry, which taper from 15 ft. 2 in. by 9 ft. 2 in. at their foundation, to 9 feet by 3 feet at the top, the largest dimensions being in the direction of the bridge. They are connected together, transversely with the bridge by a light arch across the roadway. The height of the towers above the water level is 37 feet—viz., 16 feet from the surface of the stream to the upper line of the roadway, and 21 feet from the roadway to the top of the towers. On each side the foundations are made about five feet below the water-mark. All the masonry is built of a reddish freestone, from Bonhill. Upon the tops of the towers are large cast-iron plates, on which the chains-rest; the chains for supporting the structure are formed of seven-eighth round bars, laid side by side, to the number of thirteen, upon the tops of each of the towers, and successively dropping one at each joint, until it arrives at the center of the bridge, where that part of the chain is reduced to a single bar. The links upon the towers are 6 feet long, but, after springing from thence, they are increased to nine feet."

The quantity of wrought-iron used in the structure is—

In the chains .... lbs.	13874
Oblique suspending-rods	4856
Longitudinal beams	5433
Transverse joist, truss, &c.	21361
Two beams	4704
5-8ths-rods running through transverse joists, ...	11628
Railing, &c.	6400
Sundry articles not specified	1400
Total .... lbs..	69656

Or ... 31 tons 1 cwt. 3 qrs. 20 lbs.

The quantity of cast-iron is about.

4 tons 11 cwt. 0 qrs. 0 lbs.

"The timber for the platform was grown on Sir James Colquohoun's estate at Luss, and about 1460 cubic feet was used."—It is Larch fir.

The bridge is calculated to sustain a permanent load between the towers of about 200 tons, or 112 lbs. per square foot. The absolute, or extreme, power of the chains, considering the iron at 27 tons per square inch, is upward of 400 tons.

As any description of the principle upon which the bridge is built has not yet occupied much space in your Journal, I am induced, without entering into any mathematical details, to add to the above a slight sketch of it. The plan may be stated to consist in so arranging the active supporting parts of the bridge, that the strain, or tension, in the main chains may gradually diminish in magnitude from each point of suspension to the centre, where, the tension, in fact, becomes entirely evanescent. To effect this, it is necessary that those bars which convey the transit load and permanent weight to the chains, and which have, in every other plan, been placed vertically should be inclined to the plane of the horizon, in angles ranging in magnitude from the towers of support to the centre of the bridge; the extent of this variation, and the magnitude of the several angles, it is not necessary here to discuss. It is in consequence of this arrangement of the subsidiary lines into an oblique, instead of a vertical position, that the advantages of this system are obtained.

The action of the oblique bars is to throw into the platform, or horizontal line, the whole of the horizontal force, which, when the vertical subsidiary bars are applied, is resisted entirely by the chains. The mode of action may be traced thus:—the weight, or gravity, of the platform, &c., acts vertically with respect to the horizon, and in the same direction as the vertical subsidiary lines, and, as action and reaction are equal and contrary, so, when these bars are used, the strain, or tension, in them must be precisely the same as that portion of the weight they respectively support. If weight be sustained in any other position than vertical, it must be by the joint action of at least two forces, the resultant of which is equal, and in an opposite direction to the weight supported; also, the resultant of the weight, and either one of the forces, must be equivalent to, and in the direction of, the remaining force. Now, it is evident that the chain, from hanging in a pendant curve, cannot sustain any weight in the direction it acts, and therefore every point of the curve must be acted

upon by three forces, all of which tend to that point, and keep it in a state of balanced rest. One of these is weight in the direction of gravity; another is the horizontal force before spoken of, and is a constant quantity, acting at every part of the curve in a horizontal direction; the remaining force is, of course, the resultant of the other two. What I mean may, perhaps, be better understood by being illustrated thus :—

Let A B be the points of suspension of the curve, A C B, hanging, that the whole may be in equilibrium. It is evident that one-half, A C, precisely balances, at the point C, the other half, B C; and, if either of these portions were removed, the other would directly adjust itself in a vertical position. Let one-half B C be removed, but suppose the other half to be prevented regaining the vertical position, by a force applied at the point C, in the direction C M; make C M the measure of this force, and it will be the measure of the tension at the point C, or vertex of the curve, and to the horizontal force above alluded to, as the constant quantity acting in that direction in every part of the semi curve. Take any point, *b*, and the tension at that point is equal to the resultant of the force, C M, and the weight of that portion of the curve, *b* C, acting in the direction of gravity, and at the point of suspension, A, it is equal to the resultant of the same force, C M, and the weight of the semi curve, A C.

If the platform, D E, be attached to the curve with vertical bars, as in fig. II., the same effect as exhibited above will still be produced, for this reason—viz., that from the lines, *a h*, *b g*, &c., acting vertically, there is the same weight conveyed to the chains in the same direction as though there were no intervening subsidiary bars. Hence, then, from this, it is manifest that the whole of the horizontal force must be resisted by the chains at every part of them; and that, at the centre, the section of iron there must be sufficient to overcome the tension caused by it. On the other hand, if we turn to the instance, fig. III., where the oblique bars, *a h*, *b g*, &c., are applied, we shall, by examining their particular mode of action, see that the constant horizontal force, C M, does not obtain; nor is there any tension at all existing in the chains at the point, C; and, for this reason, the whole weight of the platform, D E, must be conveyed to the chains by means of the *oblique* rods connected thereto for that purpose; each of these bars will sustain, and convey to the curve, its proportion of the weight. Let us instance the one, *d e*, and trace the effect of it on the system in sustaining that proportion of the weight acting at the point *e*. Now, the line, *d e*, is in an oblique direction with the horizon, and different to that in which the weight acts, therefore, in order that it may sustain that weight it must be acted upon by two forces at the point *e*; one of these is the weight, the other is the horizontal force, in the direction D E, consequent upon that weight being supported at the angle *d*, *e*, D, or otherwise than in a vertical direction. Now, the point *e* is situate in the platform, and therefore the horizontal force induced there must be resisted by it, and cannot be carried into, or effect, the curve beyond the point *d*, towards C. The action of any other lines may be examined in the same manner, for instance the tension in *c*, *f*, is induced by the action of the weight supported at *f*, and the horizontal force generated by that weight being resisted in an angle of less than 90°, and, as the point *f*, to which the various forces tend is in the horizontal line, the horizontal force acting there must be resisted by the platform, and cannot produce any effect in the chains beyond the point *c*, and so on for the remaining bars, *b g*, *a*, *h*—the weights suspended at the points *g* and *h* generating no horizontal force in the chains beyond the points *b* and *a*, the truth of which may be demonstrated in the same way as in the bars just instanced. Therefore, it follows that though, with the use of the vertical suspending rods, the variation of tension, and, of course, the required proportionate variations of sections of iron in the chain, is so very inconsiderable as to be hardly worth notice; yet, when the oblique bars are applied, the tension in the chains is reduced rapidly, from the base to the centre of the bridge, and, of course, in the same proportion, may the section of iron in them vary also.

The valuable assistance which the oblique rods give to the stability of a bridge may be understood by the following experiments :—Cut the chains in the middle, the bridge will stand as firm as ever, there being no strain there; then cut the platform in the middle, and the bridge will be separated into two independent brackets, each supported by the chains, and the strength of the horizontal line, against the abut-

ments. The force required to resist this tendency is a measure of the power conferred upon the bridge by reason of the oblique rods, independent of the advantages gained by tapering the chains. On the other hand, cut the chains of a common bridge at the centre, and it will destroy the structure; or cut the platform in the middle, and leave the chains entire, then it will be seen that there is no tendency of thrust against the abutments, nor any horizontal power in the platform, and that it is the chains only which sustain the whole structure. In a chain or rope, hanging in a pendant curve, this cannot be avoided; but in the case of a bridge which consists of curved and horizontal lines, it is clear that the vertical and horizontal forces should be divided; for it is enough for the chains in any bridge, in their position of reduced power, to support themselves, the platform, and the transit loads; besides, it is very clear that the horizontal force should not exist in the chains, to operate to their destruction—but in the platform, where it cannot act in the direction of gravity, but where it is as essentially powerful for the support of the structure as is the strength of the chains. This is evident from the fact that, in large spans on the catenary principle, it has always been deemed advisable to strengthen the platform, and further to add to it by deep and heavy trussing, for the purpose of giving additional stiffness to the structure—in short, to put a strain on the platform that would compensate for the horizontal force that ought to be there, which is so beautifully and effectually maintained in that line by the action of the oblique rods. Also, from the greater stability of the structure, and the lesser surface it exposes to the action of the wind in a storm, a bridge built on this principle is not liable to motion like one upon the plan of the catenary, where the roadway is merely hanging vertically, to the curve, whose equilibrium is affected, and the structure set in motion, by the slightest force.

JAMES DREDGE.

Bath, March 31. *Min. Jour.*

QUICKSILVER MINES OF BAVARIA.

Mr. Frederick Burr, in a communication to us, descriptive of the quicksilver mines in Rhenish Bavaria, and the geological structure of the surrounding country, introduces some particulars which are of considerable importance at the present time, when the attention of the commercial world is directed to the consideration of every country capable of the production of quicksilver; and having visited the district in company with that gentleman, we can afford our testimony to the correctness of his statements.

After having given a slight sketch of the geological structure of the tract of country in which the deposits of quicksilver occur, he says, "I proceed, now, to notice the mines themselves, those which I visited being chiefly situated in the vicinity of Bingart, Nieder Moschel, and Ober Moschel, and therefore in the mountainous country bordering on the Donners Berg, and lying rather to the north-westward of it. The deposits of quicksilver are chiefly worked in the sandstone formation before noticed, but appear to extend, in some places, into the slate. The sandstone is of a pale brownish or grayish colour, usually very compact, and approaching the nature of hornstone. In some of the mines, and especially in the Stahlberg mine, near Ober Moschel, I was much struck with its occasional resemblance to the quartz rock of the Lickey hill in Worcestershire; indeed, many of the pieces which I picked up on the surface of the mine were scarcely distinguishable from it in mineral character. This resemblance, together with the frequent occurrence of trappean formations in some parts of the district, suggested the idea whether this sandstone may not, like that of the Lickey, have been altered by igneous action, and whether, supposing it to belong to the coal series, its present compact texture may not have resulted from that cause. Numerous thin and irregular joints traverse this sandstone, and it is chiefly in them that the mercury is lodged; these joints furnish, therefore, an additional feature of resemblance to the Lickey quartz rock. In some of the mines I observed strata of a much softer description, and of an argillaceous nature, contained in the sandstone—a circumstance certainly unfavourable to the above supposition.

"The mode in which the quicksilver occurs is very remarkable, being neither a bed nor a vein, but forming, rather what may be termed *a metalliferous channel of ground*, this channel being of considerable width and extent. The direction of these channels approaches north and south, but in some mines there are two or more crossing one another; their width is quite undefined, but they are worked from five or six feet in width

to twenty or thirty, and appear to descend almost perpendicularly into the rock. One or more thin fissures, of a fluccany nature, exist in these channels of ground, and seem to be chiefly depended upon by the miners in guiding their researches, though in themselves unproductive. This fissure is termed a *kluft*, and, where I observed it, was merely a thin irregular crack, filled with reddish clay. The quicksilver occurs chiefly in the joints of the rock, which appear to be more or less filled with it in the neighbourhood of the klefts, for an indefinite width and extent; but whether it is of contemporaneous formation with the rock, or whether deposited in cracks which had subsequently opened in it, I was unable to determine. The length of productive ground in some of the mines appeared, from the extent of the workings, to have been as much as half a mile; and I was informed that its vertical extent was occasionally from twenty-five to thirty lachters (175 to 210 feet). The actual depth to which the quicksilver extends appears to be unknown, but I believe none of the mines in this district exceed 300 feet in depth. The ore from which the quicksilver is chiefly obtained is cinnabar, which varies from a bright to a dull red colour, traversing the mass of the rock in all directions, and sometimes very abundantly; but its distribution did not appear to me to follow any certain law, or to be exclusively limited to any particular strata, though such may be the case. Rich specimens often occur, which contain, along with the cinnabar, a good deal of native quicksilver, disseminated in small globules, often about the size of a pin's head; these, however, bear an exceedingly small proportion to the poorer ores, or, rather, masses of rock containing thin veins of cinnabar. Rich stones of ore, such as are often found in the most productive parts of the deposits, will yield from five or six to eighteen or twenty per cent. of quicksilver, and picked specimens as much even as fifty or sixty per cent.; but, taking the general average of the stuff raised from the mines, I was informed the produce was only equal to about one per cent.; this however, did not appear well ascertained, and has been considered too low. It will be seen, therefore, that quicksilver considerably resembles the precious metals, as regards the mode in which it has been disseminated by nature throughout the mass of the enclosing rock, or veinstone, a circumstance to which, in addition to its limited distribution, must be ascribed the comparatively high price which this metal always obtains.

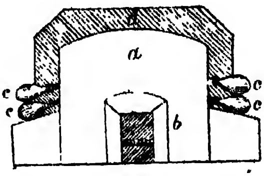
"In the vicinity of Bingart the quicksilver mines are situated on the declivity of a mountain, at an elevation of about 1000 feet above the valley, and are, in consequence, worked chiefly by adits, which enter the mines at depths varying from twenty to thirty lachters. In some of these mines, the workings above the adit are considerable, and sinks have gone down for a depth of nearly twenty lachters below. These mines are chiefly opened in the sandstone, but one of them appears to extend into the slate; they are worked to a limited extent, and a small quantity of cinnabar is raised. Immediately adjoining them is an old smelting work, now in ruins.

"The Stahlberg Mine, one of the most important in the district, is situated near Ober Moschel; it is very ancient, and extensively worked, the depth being nearly 300 feet, and the longitudinal extent of the excavations considerable. It is situated on very elevated ground, and drained by an adit, which comes into the workings nearly at the deepest point; there are no shafts, access being afforded by levels driven into the side of the mountain. This mine is still worked to some extent, and produces a good deal of cinnabar, although the present returns are very small compared to what they must have been when the workings were regularly and effectively prosecuted. The prevailing rock is a compact sandstone, or hornstone, of a similar nature to that before noticed; but containing, occasionally, softer argillaceous strata. The great magnitude and extent of the excavations, and the peculiar manner in which they have been formed, renders the appearance of this mine exceedingly singular and picturesque. We entered it by a level driven into the upper part of the mountain, and after proceeding a short distance, reached some of the upper excavations, from which the quicksilver had formerly been obtained. They consisted of a series of large irregular chambers, often fantastically overarched, and, of course, communicating with each other. The height is often considerable, and the width, in some cases, twenty or thirty feet—being regulated by the distance to which the deposit of quicksilver had been worth working. The access to these chambers, and from one to another, is by rude staircases, hewn in the solid rock, furnishing a novel and easy mode of subterranean

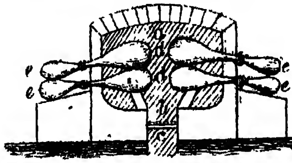
communication, differing entirely from anything which we see in the mines of this country. Our party consisted of seven or eight persons, and the unusual light and broad shadows produced by so many lamps, the spaciousness and irregular forms of the excavations, and the perspective of the rude winding steps by which we descended into the various chambers of the mine, formed altogether a scene more remarkable and more picturesque than anything of the kind I had ever previously witnessed.

"The operations are chiefly confined to breaking down old pillars and masses of orey ground, left standing in some parts of the mine: even from these sources some good produce is obtained. The cinnabar is very generally disseminated through the rock, but abounds rather more in some of the strata than others. The mercurial vapours of the mine did not produce any unpleasant effect during our short stay, although leaving a slight reddish deposit on the skin; and the miners themselves appeared but little affected by it; indeed, from the spaciousness, dryness, and good ventilation of the workings, and easy mode of access, I should imagine this mine, notwithstanding the existance of noxious mineral vapours, to be scarcely more unwholesome than the deep and hot mines of Cornwall—where the evils, although of another class, are, at least, equally oppressive, and unfavourable to longevity.

"The Landsberg Mine lies two or three miles distant from the Stahlberg, on the declivity of a lofty mountain, covered with wood, and crowned with the ruins of an ancient castle, forming a situation unusually interesting and picturesque. A lead and silver mine, called Seelberg, is worked in this vicinity; it is situated on elevated ground, the rock including the vein being a bluish-coloured grey wacke slate. The Landsberg Mine appears equally extensive with the Stahlberg, and has been worked in a very similar manner, but is, at present, wrought only on a limited scale. I had here an opportunity of observing the mode of reducing quicksilver, which, from the nature both of the metal and its combinations, is one of the most simple operations of metallurgy, consisting merely of a process of distillation. The furnace in which it is performed is about twenty-four feet long, twelve broad, and six or seven high; fires are placed at each end, the heat passing first through the body of the furnace, and then going off by a cross flue in the middle. Forty-eight iron retorts (twenty-four on each side) are arranged in the interior of the furnace, in two rows, one above the other, so as to be exposed to the heat in its passage from the fires to the cross flue in the middle by which it escapes; the necks of these retorts pass through apertures in the wall, so that smaller retorts on the outside of the furnace can be luted on to them. These particulars will probably, however, be better understood by reference to the annexed sketches; the first of which



represents an end view, and the second



a cross-section of the furnace. In reference to the former, *a* represents the body of the furnace (exterior), *b* the fire-place, *c c* the outer set of retorts arranged in two rows, one above the other, and *d* the cross flue in the middle. In the cross section *a* shows the body of the furnace (interior), *b* the fire-place, *c* the ash-pit, *e e* the small retorts, placed outside the furnace to receive the mercurial vapour, and *d d* the large retorts, arranged in the body of the furnace, in which the ore is exposed to heat, as represented in fig. 2.

"After thus explaining the construction of the furnace, the process of reduction will require but little notice; the ore, after being carefully picked and broken up, to separate the worthless matter, is put into the large iron retorts, together with a certain quantity of pulverised lime, and exposed to a moderate heat, which drives off any moisture that may be contained. The outer set of retorts is then luted on, and a stronger degree of heat, continued for some hours, volatilises the quicksilver, which passes off in the form of vapour, into the small retorts outside,

where it soon becomes condensed, and assumes a metallic form.

"In concluding this brief notice of the Bavarian quicksilver mines, I may observe that they possess the advantage of being drained to a great extent by levels, and are, therefore, almost free from water cost, while coal, for the reduction of the ore, may be obtained close in their vicinity. From the nature of the deposits, it appears to me that they are capable of yielding an immense mass of rock, more or less impregnated with quicksilver, and from the ease with which this produce can be obtained, and the occasional richness of some portions of the mass, these mines seem to offer a fair field for enterprise. Independently of what the old workings may produce, attention should also be given to new discoveries, and making trial of any portions of the deposits, which may not formerly have been thoroughly explored."—*Ibid.*

THE MINING INTEREST—QUICKSILVER MONOPOLY.

From the readiness with which the English mining companies have always submitted to the exactions of the quicksilver monopolists who have, of late years, been in possession of the mines of Almaden, it would be imagined that there was no second mine of the same description in existence, to which recourse might be had for the requisite supplies. Some years back, the article was furnished at the rate of from 1s. 6d. to 2s. per lb., and, even at this moderate price, so large was the quantity consumed that the Anglo-Spanish American Mining Companies found the produce of their earnings seriously diminished by the one single item of their expenditure. Since Messrs. Rothschild and Co. have had the command of the market, however, the burthen upon the mining interest has been greatly aggravated, for, up to a recent period, this opulent house has maintained the price of the mineral at the enormous rate of 4s. per lb., and quite recently, in consequence of the increased sum paid for the lease of the mines of Almaden, the retail charge to the consumer has been further advanced from 4s. to 4s. 6d. per lb., or equal to 12½ per cent. Now this constant encroachment upon the not too well-filled coffers of the mining companies appears to have become a grievance of sufficient importance to give rise to the inquiry whether some step should not be taken with a view to its redress? Many bubble schemes have been, from time to time, set on foot, and have resulted in losses to individuals of large amount, but still they have been losses which prudent persons have fully anticipated from the first. Enterprises of questionable utility, and of still [illegible] questionable success, are, at the present moment, before the public, and there can, therefore, be no great risk in suggesting, as a fairer and more legitimate field for the employment of British capital, as well as of British machinery, skill, and perseverance, the reopening of the quicksilver mines of Idria, in the south of Germany, as a means of abating the ruinous tax to which the mining interests of this and other countries are exposed through the inordinate demands of the contractors for the Almaden Mines. The United Mexican Company is at the present time, subject, it is understood, to the annual charge of from 12,000*l.* to 13,000*l.* for its supply of quicksilver, and, unless an effort be made to relieve themselves from the effect of the Spanish monopoly, there can be no guarantee to the shareholders against a much heavier charge for the article a year or two hence. As a means of reducing the expenditure at the mines of Almaden, it may be the pleasure and policy of Messrs. Rothschild and Co., M. Salamanca, or whoever else it may be that holds the lease for the ensuing term, to curtail the quantity raised, the power possessed by the contractor of increasing his retail charge to any extent he desires being always one that may be so exercised as to make his money returns the same.

The mines of Idria were inundated two or three years ago, but parties who visited them prior to that event, speak of them as admirably adapted, under present circumstances, to the wants of our mining companies. Could the produce of the Idrian mines be brought into competition with that of the mines of Almaden, and the works be carried on with energy and spirit, there can be no reason why the retail price of quicksilver should not be reduced to the old standard of 1s. 6d. to 1s. 9d., or, at the utmost, 2s. per lb. The hint may, at all events, be thrown out as one not unworthy of consideration in these enterprising and speculative times. The Ban of Idria, according to Dr. Rees, is a district of Carniola immediately subject to the Chamber of Inner Austria,

at Gratz. The quicksilver mines were discovered in the year 1499, and the hill of Vogelberge has annually yielded more than 300,000 lbs. weight of mercury. The common ore is cinnabar, or quicksilver and sulphur combined; but sometimes the pure quicksilver runs through the crevices. Idria is surrounded with woody hills, and the Vogelberg, on the east, produces oaks and broom, while the interior consists of red clay, calcareous rock, and a black soft slate, with covers the metallic vein in a southern direction. The deep descent is by ladders and stairs of stone, and the length of the galleries is computed at 1580 feet. It can hardly happen but that measures will be taken, either by the public companies or private capitalists, here or abroad, to counteract the injurious influence of the monopoly established in Spain, by resuming operations in the mines of Idria, or seeking supplies of the mineral in other and less expensive quarters.

Min. Journal.

COMPOSITION FOR RENDERING BOOTS AND SHOES WATER PROOF AND AN OIL FOR ASTRONOMICAL INSTRUMENTS.

The first composition, the invention of Col. Macerone, consists simply of two parts of Tallow and one part of Rosin melted together and applied warm. The indefatigable Mr. Baddeley in a letter to the Editor of the "Mec. Magazine" speaking of this composition thus expresses himself.

While I was recently in Hamburg, I heard Colonel Macerone's composition spoken of in the most complimentary manner, and Mr. Campbell, (the agent there for the *Mechanics' Magazine*,) informed me that he had adopted a novel method of application, which had been attended with considerable advantage. Instead of brushing the composition over the *external* surface of the boot, he had applied it *internally*. The boot being thoroughly warmed before the fire, the melted composition was poured in, and after turning the boot about, so as to apply the composition to every part of it, the superfluous quantity was poured out. The boot was then kept warm until the composition had been wholly absorbed by the interior surface of the leather. On wearing the boots so treated, the first pair of stockings was soiled slightly; the second, not at all; while the boots were rendered wholly impervious to wet, carried the most brilliant polish that "Day and Martin" could bestow, and were entirely free from that unpleasant sensation of *coldness* which is always experienced from boots to which the composition has been applied externally.

Mr. Campbell further informed me, that he had obtained a most excellent lubricating material for sextants, and other delicate astronomical instruments in brass, by mixing a small quantity of rosin with the best olive oil; in the proportion of one ounce of rosin to a pint of oil melted together. The oil thus treated never turns rancid, nor does it produce verdigris when applied to the finest brass work.

The oil which is applied to leathern hose should be treated with a small quantity of rosin; for if it is sewed this will prevent rancidity destroying the stitches—if riveted, it will prevent the formation of verdigris, which takes place to a considerable extent whenever oil alone is used. Yours respectfully,

WM. BADDELEY.

[*Mechanic's Magazine.*

EXPERIMENTS ON SUBTERRANEAN ELECTRICITY, MADE IN PENNANCE MINE, NEAR FALMOUTH. BY R. W. FOX.

I have already communicated to the Geological Society of London some results produced by the electric action of two nearly east and west metaliferous veins, which have been partially explored in Pennance Mine. I have since made other experiments in the same mine, in which ore points, consisting of copper and iron pyrites in the two veins, were connected by a pair of copper wires which, in most instances, acted on a galvanometer or other apparatus at the surface, an end of each wire having been brought up through a shaft for the purpose; about fifty fathoms of wire were employed, although the ore points in the different veins were only about fourteen to eighteen fathoms asunder in a direct line. A galvanometer of not much sensibility was generally used; the needle, which was two and a half inches long, moved on a pivot, and had a coil of fine wire passed forty-eight times round it. Another galvanometer, consisting of a suspended astatic needle, and 140 coils of wire, was also employed occasionally. When the former, which call No. 1, was placed in the circuit, the needle was deflected so as to become stationary at 14° to 15° from

Zero; and it revolved rapidly round the circle when the circuit was broken and restored a few times, the direction of electricity being from the south vein to the northern one. The other galvanometer (No. 2) suffered a permanent deflection of about 40° when in the circuit. The interposition of a plate of platinum or zinc at either of the ore points, or of a point, instead of a considerable surface of metal, did not affect the direction or force of the currents; they were, moreover, constant in both these respects during more than eight months that the two veins were connected by the wires, and a part of this time the mine was filled with water, in consequence of an accident to the machinery. Ore points in the two veins, situated within two or three feet of the others respectively, were, at one time, connected by a second pair of copper wires of the same lengths as the first—both sets of parallel wires being kept apart, and insulated from the sides of the levels, or galleries, by poles stretched across the latter at short intervals. When galvanometer, No. 2, was placed in the second circuit, No. 1 remaining in the other, the needle of the latter receded at least 2°, standing at 12°, instead of 14° or 15°, and the former stood at 5° or 6° less than it did when only one circuit was established. On breaking either of the circuits, the deflection the needle in the other circuit was increased to its original amount; and, when both pairs of wires were connected with only one of the instruments, the effect was almost precisely the same as that produced by one pair alone—not greater, certainly. A copper and zinc pair of plates, of about six inches surface, separated by a piece of cotton cloth moistened with water, was placed in the circuit, and when the currents from this source and the veins coincided in direction, the needle of galvanometer, No. 1, stood at about 10°—that is, at less than it did when acted upon by the subterrannean electricity alone, and when the deflection caused by the latter was afterwards opposed by the action of the plates, the needle went back to Zero, and even sometimes passed a little beyond it in the opposite direction. These anomalies may, perhaps, be referred to the low conducting power of the moistened cotton, which, small as its thickness was, very probably interrupted the transmission of the electricity more than the fourteen or eighteen fathoms of strata or "country."

On taking the voltaic elements from the circuit, and connecting them with the galvanometer, so as to form a separate circuit acting in an opposite direction to the electricity from the mine, the deflection showed a difference in favor of the latter, and, indeed, this was the case when the interposed cloth was moistened by a very weak solution of common salt. The electro-magnetic and decomposing effects of these subterranean currents also afforded unequivocal evidence of their energy. A helix of copper wire, fixed round a small horse-shoe shaped bar of iron, was placed in the circuit formed by the wires from the veins, when the bar became so magnetised as to cause a compass needle 1½ inch long, at the distance of nearly half an inch, to oscillate through an arc of about 70°, when the circuit was alternately made and broken a few times. A solution of hydriodide of potash was found to have been decomposed after it had been left in the circuit for rather more than a day. The endosmose action occurred in various experiments, but it may be sufficient to give one example. Sulphate of copper in solution was put into both branches of a U shaped glass tube with clay in the bent part of it, the surface of the fluid in one branch, standing half an inch above that in the other. A piece of silver wire was plunged into each of them, the upper end passing out through sealing-wax, with which the extremities of the tube were stopped, and the apparatus was placed upright in the circuit, with the wire in the higher column of the fluid connected with the negative wire. In the course of a few days, this column was found to have risen one-eight of an inch, the other having fallen in an equal degree, showing that the greater pressure of the higher column was superseded by the force of the electric action. When small cylinders of copper pyrites were substituted for the silver wires in the branches of the bent tube, not only did the endosmose action occur, but the copper ore, forming the negative pole, had its surface gradually changed to vitreous copper in the course of two or three days [some of the ore thus changed was shewn at the last Polytechnic exhibition] the other ore pole remaining unaltered. The same change was produced, and, apparently with equal facility, when solutions of other salts, as carbonate of soda, or common salt, were substitued for that of sulphate of copper, in both branches of the tube.

The cylinders of copper pyrites used in these experiments, were long enough for the upper ends to project above the mouths of the tube, where the opposite wires were attached to them respectively, and these were well coated with sealing-wax dissolved in alcohol, to prevent the access of moisture to any part of the metal, and, indeed, all but the lower portions of the ore were coated in like manner. In some instances, the cylinders of copper pyrites were allowed to remain in solutions of sulphate of copper in the bent tube for several weeks, when deposits of oxide of iron were found coating the inside of the tube about the negative pole. These results remind one of the ochery appearance observed in rocks inclosing much vitreous copper—a fact noticed by my friend Joseph Carne; and it may be worth while to inquire how far the proportion of "gossan" in copper veins may be connected with the quantity of vitreous ore contained in them.

Since the foregoing experiments were made, I have obtained an electro-type copper plate, one inch and a half long, one inch and a quarter wide, and one-thirtieth of an inch thick, by the agency of these subterranean currents. The apparatus consisted of a porous earthenware vessel, resting on wooden legs in a larger one; both were partly filled with solutions of sulphate of copper, an engraved copper plate attached to the negative wire, being placed in the outer vessel, and another plate of copper attached to the positive wire, in the inner one. After a few days it was observed that crystals of copper had been formed on the negative plate but it was nearly two months before the apparatus was removed from the circuit, when the deposited metal was detached from the plate, having received its impression, VI INSITA TERRÆ. Whilst this experiment was in progress at the surface, the water, as I have before mentioned, invaded the mine, but without interrupting the process; it appeared, indeed, that the electric action was rather increased than diminished by this circumstance. Before the influx of the water, an ore point in the north vein was connected with rock near the south vein (generally the wall of the vein), and an ore point in the south vein was likewise connected with rock near the north vein, in both which cases, currents more or less feeble, were detected passing towards the latter through the wires, which were insulated, as before, by wooden poles stretched at intervals across the galleries. It is probable that the moisture on the rocks conducted the electricity from the ore to the metal, however imperfectly, and when different metals, as platinum and zinc, were successively substituted for the copper in contact with the rocks, the currents were modified in their force according to the metal employed, but were seldom changed in their direction. The action was most decided when the place of contact with the rock was near ore; and sometimes the end of the wire, or rather the piece of copper attached to it, was rubbed by an assistant against the walls of one of the veins, or the sides of a "cross cut" between them. Under these circumstances, the astatic needle was several times suddenly much deflected, and the parts of the rocks from which this increased action proceeded, having been marked, they were broken away when iron pyrites was, in every instance, found imbedded in them; and there can be no doubt that the smallest branch of copper or lead ore might have been detected in like manner. On several occasions, the ends of the opposite wires were placed in contact with the rocks near the two veins, when there still appeared to be a tendency in the currents to pass in the same direction, but often they could not be detected, or were too feeble for their direction, to be determined with certainty. Pieces of copper pyrites attached to the wires, and imbedded in wood, were likewise used instead of the metal, for producing contact with the rocks, and with still less effect; and when the contact was made with platinum and zinc in succession, the currents were in opposite directions, and in accordance with the action of those metals respectively; so that the existence of independent currents under the circumstances described, though more than probable, was not clearly proved. Electricity, generated by a pair of zinc and copper plates, was transmitted through the rocks between the two veins from north to south, and also from south to north, in order to detect any independent currents traversing the rocks by a differential effect on the needle. This method appeared likely to be a very delicate test of electric action in rocks, but no decided results were obtained, the currents passing in opposite directions apparently with equal facility, at least, the few experiments hitherto made in this way, have not led to any

satisfactory conclusions relative to the point in question. It should be remarked, however, that the astatic needle employed, was inconveniently sensitive, and was often set in motion when the cause was not very obvious. With needle, No. 1, the case was widely different, as it could scarcely be moved by any subterranean currents that were not tolerably energetic, such as were produced when both the wires were in contact with ore points, and then, as has been stated, it often revolved rapidly.

It has been long known that electric currents will traverse a very considerable thickness of rock or strata,* but in what degree this property may be modified by the nature or texture of the rocks, the saline contents of the subterranean water, or the proportion of ores included in the circuit, remains to be ascertained. If the influence of these different circumstances should greatly vary, electric currents generated by given elements might be rendered available on various occasions—to ascertain, for instance, the connection of saline springs not very distant from each other, often appearing at the surface, or in mines; or of a metalliferous vein discovered in one place, with a vein which has been worked for ore in another. The conducting power of the circuit at Pennance Mine, already described, was, in this way, found to equal that of a tolerably strong solution of common salt, the current in the latter experiment having to traverse an inch of the solution and short copper wires to complete the circuit. The conducting power of the rocks or strata in this case, therefore, appeared to be very great. When some sulphate of copper was added to the solution, the conducting power of the latter exceeded that of the strata. Glass tubes filled with solution of salts in different known proportions might be used as tests in experiments on the relative conducting power of different strata, and they might be referred to as standards in describing the results.

Min: Jour.

* Many instances of this occur in my paper "On the Electro-Magnetic Properties of Metalliferous Veins," published in 1830, in the *Phil. Transactions*, p. 399. I have long ago seen a very feeble current act on a sensitive galvanometer after it had traversed nearly a quarter of a mile of strata, and stronger currents would, probably, be detected in like manner, after having passed many times that distance under the surface.

THE MOTION OF VESSELS CAUSED BY WAVES APPLIED AS A MOTIVE POWER.

A power which has long been vaguely known to exist, but the idea of ever bringing it into use never appears to have been even thought of, is just now being brought under notice by Y. A. Etzler, Esq., who, by means of some very simple machinery, has made the alternating perpendicular motion of a ship, by the power of the waves, subservient to her horizontal motion through the water. To conceive how this power can be brought into action it is necessary to know, that to whatever height a wave rises, it has no effect on the calm of the water below, further then at a depth equal to its height, and hence it is easy to render the power of waves efficient, by offering them a resistance; for the propulsion of a vessel, this resistance is obtained by connecting a sort of platform placed *beneath* the undulation of the waves, with the vessel floating *in* them: at both ends of this platform and brought up on each side of the vessel, are strong connecting rods, attached to arms working on an axis; to these arms are fixed ratchet rods, working in tooth wheels, connected with the paddles, and at every pitch of the vessel the alternate perpendicular motion causes the paddle-wheels to revolve. This is the most simple application of the power, but, by a proper arrangement of requisite machinery, fly-wheels, &c., the motion of the vessel may be regulated as true as by the steam-engine, and by springs placed in proper parts of the two floating bodies—viz., the vessel and the platform—all danger may be resisted, and concussion rendered harmless. Mr. Etzler calculates that 20 to 30 miles per hour can be easily and safely attained by these means, and that, taking into consideration the duration of calms, when there is always an undulation of the sea, the average rate of velocity on long sea voyages may be estimated at from ten to twenty miles an hour. A perfectly successful experiment has been made off Margate, with the most simple mechanism, and a model is exhibited in the captains' room at Lloyds for public inspection.

[*Ibid.*

THE NEW STEAM-SHIP "BENTINCK."

The *Bentinck* is 250 feet in length from the head to the taffrail, 40 feet in breadth, 31 feet in depth, and admeasures, including spar deck, 2020 tons ; her engines are of 520-horse power, and her cost about 84,000*l.* To guard as much as possible against accidents, she is fitted with water-tight iron bulkheads, dividing the vessel's hold into a number of water tight compartments. The advantages of this arrangement, first adapted to wooden built vessels by C. W. Williams, Esq., one of the directors of the company, are of a most important nature ; besides adding greatly to the strength of the vessel, they effectually prevent her from sinking in case of springing a leak, by striking on a rock, or otherwise, because no more water can enter the vessel, in such a case, than to fill to the water-line the particular compartment in which the leak may happen, and the vessel will, therefore, continue to float nearly as before. One or two recent melancholy instances of extensive loss of life by steam-boat accidents may be pointed out, in which, had the vessels been fitted with the water-tight bulkheads, no loss of life would probably have ensued. Besides the above protection, the *Bentinck* is fitted with the patent paddle-box life boats, which, with her other boats, afford ample means of carrying the whole of the crew and passengers, with provisions and water, in case of accident to the vessel. She has also a complete apparatus, including a powerful force-pump, for extinguishing fire instantaneously in any part of the ship. Another improvement of considerable importance, and deserving of mention, is her being fitted with Mr. William's patent smoke consumers which considerably diminish, or altogether prevent, the issuing of smoke from the funnels. The interior arrangements are on a scale of great splendour, combined with every attention to comfort and convenience ; she has accomodations for 102 cabin passengers, consisting of twenty single cabins, twenty-two double cabins, and twelve family and general cabins, with capacious and elegant saloons,

The *Bentinck*, on the whole, reflects the utmost credit on the spirited company to which she belongs, for, besides the improvements we have enumerated, there are several others introduced—one we must especially particularise, that of Mr. Andrew Smith's patent wire rope, which the directors have wisely availed themselves of, not only for economy, but from its acknowledged vast superiority, in every respect, over hempen ; we also noticed some life-belts, of either Carte's or Andrew's manufacture—but the vessel possesses so many attractions as to render it an object particularly deserving the careful inspections of every one interested in the progress of ship-building. We may add, that her average speed on a passage from Dublin Bay to Southampton—was thirteen miles per hour, and occasionally she ran fourteen miles per hour—being a higher rate of speed than any other vessel adapted for ocean steam navigation has yet attained. *Ibid.*

NEW ANEMOMETER.

A letter from Rochefort, in the *Debats*, says :—" We have lately had here a trial of a new instrument, intended to show the probable courses of the winds. It consists of a thin piece of wood three or four inches long, freely balanced, as the needle of a mariner's compass, on a steel pivot, by means of an agate, inserted in the wood. At one of the extremities, at about a third of the length, there is made a slit, in which are placed three or four magnets, about half an inch from each other. They are formed of bits of flattened watch-spring, from one to three inches in length. They are fixed perpendicularly to the horizon, and therefore free from all polarity. They all have their south pole above the bit of wood, and their north pole below it. These magnets act exactly as the directing finger of a weathercock, and show the direction of the wind. The instrument may furnish interesting instructions with respect to the connection between magnetism and electricity, on the probability that the variations of the winds are due to electric currents. What renders it of great importance, is the fact, that these indications take place a quarter of an hour, and sometimes even half an hour, before the changes which occur in the winds, as those of the barometer do in the variations of the weather." *Ibid.*

ISTHMUS OF PANAMA.

According to a communication made by M. Arago to the Paris Academy of Sciences, a contract has been entered into by Messrs. Baring and Co., of London, with the republic of New Granada, in virtue of which the republic is to cede to them the line required for the projected canal, with 80,000 acres of land on the two banks, and 400,000 acres in the interior of the country.

Messrs. Baring and Co. had, it is said, in the first instance, fixed the amount of toll for the navigation of the canal at the exorbitant price of eighteen francs per ton, but they have reduced it to eight francs. The work, upon which 4000 to 5000 men are to be engaged, is to be completed in five years.—*Ibid.*

SCIENCE IN VIENNA AT A DISCOUNT.

"The higher branches of science are at a very low ebb in Vienna. * * Chemistry has never had existence there; astronomy is buried in the grave of its late professor; mineralogy is locked up within the glass cases of the K. K. cabinet of the Emperor (unless it may again flourish in the person of Mr. Haidinger); physiology is but a name; and geology and comparative anatomy are still unborn in the Austrian capital—the former because it is, or was, *forbidden* to be taught, lest it should injure the morality of the religious Viennese!—and the latter because it has not yet been specified in the curriculum of education prescribed by the state. One is hardly credited, when he states, that there is not one comparative anatomist of note in Vienna, or that this branch of science forms no part of such extensive practical medical study as that prescribed in this university."—*Wilde's Austria.*

CHEMICAL PHENOMENA.

At a recent sitting of the Academy of Sciences, Paris, M. E. Millon read a memoir containing the results of experiments which he and M. Reiset had carried out, in regard to chemical phenomena due to contact, or what is termed catalytic force. They have numerically extended the phenomena of oxidation by catalysis, and have obtained the combustion of organic substances at temperatures but slightly elevated. Tartaric Acid, under the influence of spongy plantinum, yielded water and carbonic acid at + 160°; cane-sugar began to give off carbonic acid and water from + 140° to + 150°; this point of oxidation is the same for the sugar of raisins, of milk, and of diabetes; butter gives carbonic acid from + 90° to + 100°, and olive oil between + 80° and + 90°; stearic acid and wax burn at about × 100°; their combustion is complete below + 200°.

Platinum determines with equal activity operations entirely opposite. It disunites as well as reunites, it destroys molecular groupings, it acts as heat. If two tubes, containing the same quantity of nitrate of silver, but mixed with spongy platinum in the one, and pure in the other, be plunged into a sand-bath, and the temperature gradually raised, the salt of silver will be entirely destroyed in that containing the platinum before decomposition is commenced in the other tube; and MM. Reiset and Millon have realised for platinum the same effect on chlorate of potash which oxide of copper or of manganese exercises. Pumice-stone also acts as platinum in regard to the chlorate; and in all cases with the platinum or pumice-stone the destruction of the chlorate is complete before the chlorate alone has disengaged a single bubble of gas. Nitrate of ammonia presents, under the same circumstances, analogous phenomena, but more striking. From the platinum tube may be obtained a regular disengagement of gas at + 160°; but on examination this gas has none of the properties of the protoxide of azote. The ammoniacal salt, instead of undergoing the ordinary transformation, as if acted upon by heat, is converted into nitric acid, azote, and water; and the temperature at which nitrate of ammonia is decomposed, is lowered by the presence of platinum about 70°. Pumice-stone is not so active on nitrate of ammonia as platinum; it gives, at + 230° only, a mixture of azate and its protoxide, the latter predominating. Charcoal produces the separation of the elements of the same substance at + 170°; but the development of the gas is accompanied, although at this low temperature, with a violent explosion. In acts, doubtless, in the same manner as platinum and pumice-stone, but with more energy in this case. Other examples were given, to show that spongy platinum, pumice-stone, and charcoal, constitute three agents of contact, but very different; they do not possess an absolute activity, but act in different degrees on the same substance, and perhaps, in regard to several bodies, are active on some, and inert on others; they all, however, exercise an activity of contact which render them important physical agents. The effect of the two former on alcohol, ether, and acetic acid, is very marked. Oxalic acid, again, resists their influence; but the contact of powdered charcoal introduces great changes into its mode of decomposition.—In conclusion, M M. Reiset and Millon remark, that combustion at low temparatures,

obtained under the operation of substances of contact, bring nearer to ordinary phenomena of science the oxidation which food in our organs doubtless undergoes. *Min: Jour.*

THE PELLATIAN LIGHT.

A new kind of illumination is about being introduced, under the above title, which bids fair to supersede the present system of gas-lighting in dwelling-houses, &c. We were favoured, on Saturday evening last, with a private view, for the purpose of comparing the powers of this light; and it is certainly equal to the most brilliant carburetted hydrogen. It gives a beautiful white, clear, lively flame, which can be elongated at pleasure, without producing a smoky termination, blacking the ceiling, or tarnishing gilt-work, metals, &c. It is confidently stated that it can, under all circumstances, be produced at least 40 per cent. under any other kind of gas; and when it is understood that it can be manufactured by placing an apparatus beside a common fire, and attended to with little trouble and no danger, it will be seen at once how highly advantageous it must be for detached mansions, buildings far removed from gas establishments, small villages, &c., while its economy will go very far to bring it into general use. *Ibid.*

THE MONOCHORD.

At a meeting of the Society of Arts in January of the present year, Mr. Higgs described a beautiful little instrument called the Monochord, to facilitate the study of vocal music. Mr. Higgs does not claim to be the orginal inventor, but takes credit to himself for bringing it practically into use, at a time when vocal music is considered an essential part of the education of the rising generation. Unlike the tuning-fork, which is capable of sounding only one tone or note, the Monochord produces any of the notes either of the diatonic or any other scales; and moreover gives a correct idea of vibration and the theory of sound. The Monochord is an oblong rectangular box, made of mahogany, 26 inches long, 2½ inches wide, and 2½ inches high. On the upper surface of the top are marked the diatonic and chromatic scales; a single wire is extended lengthwise over a bridge at either end of the instrument; and the different notes are produced by the moving a third bridge (over which the wire also passes) along the top of the instrument. *Polytechnic Jour.*

THE MINERAL "SLICKENSIDES."

The mines in Eyam-edge are very deep, and the New-engine mine I have heard stated as being the deepest in Derbyshire. Among the number in the edge is the Haycliff, a mine distinguished for having contained, in great abundance, this extraordinary phenomenon in the mineral world, provincially called "Slickensides." It is a species of galena, and is well known amongst mineralogists. This mine once had it in singular quantity and quality.

The effects of this mineral are terrific; a blow with a hammer, a stroke, or scratch, with a miner's pick, are sufficient to blast asunder the massive rocks, to which it is found attached. One writer says "the stroke is immediately succeeded by a crackling noise, accompanied with a noise not unlike the mingled hum of a swarm of bees; shortly afterwards an explosion follows, so loud and appalling, that even the miners, though a hardy race of men, and little accustomed to fear, turn pale, and tremble at the shock." Of the nature of this mineral, and its terrible power, there have been many, but quite unsatisfactory, solutions. Whitehurst, in his work on the formation of the earth, thus mentions its wonderful power:—"In the year 1737 an explosion took place at the Haycliff mine, Eyam, by the power of Slickensides. Two hundred barrels of materials were blown out at one blast, each barrel containing 350 lbs. weight. During the explosion the earth shook as by an earthquake." A person of the name of Higginbotham once very narrowly escaped with life, by striking incautiously this substance in the above mine. Experienced miners can, however, work where it greatly abounds, without much danger. It is also known by the name of "cracking-whole."— *Wood's Desolation of Eyam.*

THE CARBONIC ACID ENGINE.

Mr. Isham Baggs has now enrolled his specification for this new means of obtaining motive-power, in which it is stated—"that it consists in so constructing machinery, that suitable chemical matters may be employed to evolve carbonic acid gas, the pressure of which, acting against a piston in a suitable engine, produces motive-power, and the

carbonic acid gas having been so employed, is allowed to pass from the cylinder into a vessel containing suitable chemical matters to absorb the carbonic acid, and thus destroy the force it previously possessed." To effect this, a portion of the super-sulphate of ammonia from one vessel, and the carbonate of ammonia from another, are simultaneously injected into a vessel called the "generator," from this union the whole of the carbonic acid contained in the carbonate of ammonia is given off with great force, and acts on the piston of the engine; having effected this, it is passed off by a pipe into a vessel containing a simple solution of ammonia, which quickly taking up the acid, reduces the pressure on that side the piston, and is ready to make up the loss in the vessel containing the carbonate of ammonia. By a suitable arrangement of apparatus, a perfect decomposition and recombination of the carbonate of ammonia goes on, exerting an enormous power, and, compared with steam, at scarcely any expense. We are not at present in possession of sufficient data to state the advantages obtained by this power, but shall, in a future Number, give a perfect illustration of the apparatus, with a detail of its power and cost.

Min: Jour.

BURNETT'S PATENT FOR PRESERVING WOOD, &c.

The plan patented by Sir William Burnett for the preservation of timber, canvas, cordage, &c., from dry rot, mildew, moth, and the destructive effects of damp, or the combined action of air and water, is a colourless metallic salt, which is prepared for use by solution in water, in the proportion of one pound of the substance to ten gallons of water; which quantity, procurable for the sum of 1s. 6d., is sufficient to prepare and preserve half a load of timber. By an hydraulic injecting apparatus, employed in her Majesty's Dockyard, at Portsmouth (which is capable of saturating twenty loads of timber at a time), the gravity of the wood is increased 64 per cent., although, afterwards, lessoned by drying; by a stronger solution than the above, wood, canvas, cordage, &c., are rendered incombustible, and all the men-of-war are, in future, to have their magazines fitted with wood and felt, especially prepared for this purpose; and the solution being colourless, does not affect the colour of the material to which it is applied.

Numerous experiments have been tried, extending over a period of nine years, to ascertain, with certainty, the effect of the process on various substances. Specimens of English oak, English elm, and Dantzic fir, one of each prepared with the solution, and one of each unprepared, were placed in the fungus pit at Woolwich, on the 25th Aug. 1836, and taken out on the 15th July, when the prepared specimens were found to be perfectly sound, while the unprepared English oak had a spot of fungus on one end, the English elm decayed, and the Dantzic fir had fungus outside, and was decayed at heart. A quantity of Burnetised deals, with other pieces of the same wood unprepared, were put down in the damp cellar of a house in Chatham Dockyard, where the floors had been repeatedly destroyed by dry-rot, and where large fungi were growing in 1838, and in 1842 all the unprepared wood had become completely rotten, while the Burnetised portion was completely sound, and relaid with more unprepared deals for further experiment. Six pieces of canvas, and three of woollen cloth prepared, and the like samples unprepared, were placed in a hole four feet deep, in a damp situation, and exposed to the sun, where they remained six months; they were then taken up, washed in plain water, and dried, then placed in a deal box, and deposited in a damp sink, but not in contact with water; they were left in this situation nine weeks, and when examined, the prepared articles were perfect as ever, the unprepared perfectly rotten. These are a few of the experiments, and which are sufficient to show the nature of the process, and the powerful effects of the solution, which is now universally adopted in Her Majesty's dockyards, and is coming into very general use.

In confirmation of the reported good qualities of Sir W. Burnett's process, we have had the following letter handed to us :—

Tallamoore, King's County,
Ireland, July 10.

I certify that I have made use of a large quantity of *domestic timber* (beech, elm, and Scotch fir) in the repairs of my boats on the Grand Canal, which was prepared in Sir William Burnett's process three years since; most of it I find to be perfectly sound, which would not have been the case had it not been so prepared, as I have had repeatedly *Memel timber* decayed in less time in the same situation.

(Signed) THOMAS BERRY.

Min : Jour.

INDEX TO THE AUTOGRAPHICAL MEMORIALS

OF EMINENT PHILOSOPHERS, ENGINEERS, AND MECHANICS,

Plate 24.

Airy, George Biddel, Esq. M. A. F. G. S. Plumian Professor of Astronomy and Experimental Philosophy, Cambridge.

Arago, M. Dominique Francois, Member of the Institute of France, in which he succeeded to the place of the scarcely less celebrated Lalande, and Secretary to the French Board of Longitude; pre-eminent among the living Philosophers of France, for the splendour and universality of his genius; there is scarcely a branch of Science which he has not illustrated, and enriched by his labours. Joint Editor with M. Gay Lussac, of the "Annales de Chimie et de Physique."

Biot, M. Baptiste Jean, Professor of Natural Philosophy in the University of France, Member of the Institute, &c. Author of the "Traité de Physique," one of the most lucid and profound works on the Physical Sciences, which modern times have produced.

Ferussac, Baron, the able and public spirited Conductor of the *Bulletin des Sciences.*

Gwilt, Joseph, Esq., Architect, Author of "Treatise on the Equilibrium of Arches."

Inman, Rev. James, D. D., Professor of Mathematics, Royal Naval College, Portsmouth.

Lawrence, William, Esq., F. R. S. Surgeon to St. Bartholomew's, Bethlem, Bridewell, and London Fever Hospitals.

Lubbock, John William, Esq., M. A. V. P. R. S. F. R. A. S. F. G. S.

Macgregor, Sir James, M. D. F. R. S. K. C. T. S. K. C. Bart. Physician Extraordinary to the King. Director General of the Medical Department of the Army.

Macintosh, Sir James, the late eminent Orator, Metaphysician and Historian, Author of the History of Ethical Science, in the Enc. Britt. For the loan of the interesting Autographical Criticism on Sir J. F. W. Herschell's "Discourse on Natural Philosophy," given in the Engraving, the Editor of the Mec. Mag. was indebted to his esteemed correspondent Sir George Cayley, Bart., M. P. for Scarborough.

Malthus, Rev. T. R. M. R. F. R. S. Professor of History and Political Economy, East India College, Heyleybury; Author of the celebrated "Essay on the principle of Population."

Morgan, William, the late Eminent Calculator, and Writer on Finance; died 1832.

Paris, John Ayrton, M. D. F. R. S. F. L. S. Author of "Life of Sir H. Davy." "Science in Sport made Philosophy in Earnest." Treatise on Diet;" the Inventor of the ingenious toy called the *Thaumatrope.*

Peacock, Rev. George, M. A. F. R. S. F. G. S.

Pond, John, Esq., F. R. S. Astronomer Royal.

Quetelet, M., Director of the Observatory, at Brussels.

Rennie, George, Esq., C. E. F. R. S.

Roget, Peter Mark, M. D. Sec. Royal Society, F. R. A. S. F. L. S.

F. G. S. Author of the Useful Knowledge Society's Treatises on Electricity, Galvanism, Magnetism, and Electro Magnetism.

Shee, Sir Martin Archer, President of the Royal Academy, F. R. S.

Smith, Sir James Edward, Founder and First President of the Linnean Society, Author of "the English Flora."

South, Sir James, President of the Royal Astronomical Society, F. R. S.

Smirke, Sir Robert, Architect, R. A. F. R. S.

Taylor, Thomas, Esq., the able Translator of the Works of Plato, Proclus, and Aristotle; Author also of "Elements of a new Method of Reasoning in Geometry," "Dissertation on Diverging Series," and of several curious Papers on the properties of Numbers in the Mec. Mag.

Whewell, Rev. William, of Trinity College, Cambridge, M. A. F. R. S. F. G. S. Author of "Elementary Treatise on Mechanics."

Wyatville, Sir Jeffery, Architect, F. R. S. F. A. S. Renovator of Windsor Castle, one of the few works which do honour to the architectural taste of the present times.

PLATE 25.

Allan, Thomas, (late), F. R. S. L. & E. Author of some valuable Papers on Mineralogy and Geology, in the Transactions of the Royal and other Societies; died 1832.

Bidder, Mr. George, the once celebrated "Calculating Boy," now Assistant Civil Engineer to the East India Dock Company.

Blake, Robert, Esq., Assistant Master Shipwright, Royal Dock Yard, Portsmouth, Inventor of the round sterns, patent fid, and many other valuable improvements in Naval Architecture.

Burnett, Sir William, M. D. K. C. B. Medical Commissioner of the Navy.

Cumming, Rev. James, M. A. F. R. S. Professor of Chemistry, Cambridge.

Cockerell, Charles R., Esq., Architect, A. R. A. F. A. S. Author of "Antiquities of Greece."

Daniell, J. F., Esq., F. R. S. Professor of Chemistry, King's College.

Donaldson, Thomas Leverton, Esq., Architect; Author of "Collection of approved Examples of Doorways from Ancient Buildings in Greece and Italy," &c.

Elliotson, John, M. D. F. R. S. Professor of Practical Medicine, University of London, Physician of St. Thomas's Hospital, and President of the Phrenological Society. At this time Professor or advocate of Mesmerism.

Fitton, W. Henry, M. D. F. R. S. F. G. S.

Forbes, James David, F. R. S. L. & E. F. G. S. Professor of Natural Philosophy in the University of Edinburgh.

Galloway, Thomas, Esq. M. A. Professor of Mathematics, Royal Military College, Sandhurst.

Greenough, George Bellas, Esq., F. R. S. F. L. S. F. G. S. Vice President of the Royal Geographical Society.

Haviland, John, M.D. F. G. S. Regius Professor of Physic, Cambridge.

Heath, James, Esq., Senior Associate Engraver, Royal Academy.

Heaton, Brothers, Engine Makers, Birmingham, Inventors of a Steam Carriage, Safety Gun Lock, &c.

Henslow, Rev. John Stevens, M. A. F. L. S. F. G. S. Professor of Botany in the University of Cambridge.

Johnston, James F. W., Esq., M. A. F. R. S. E.

Kirby, Rev. William, A. M. F. R. S. F. L. S. F. G. S. Rector of Barham, one of the Authors of the "Introduction to Entomology."

Knowles, John, Esq., F. R. S.

Lecount, Lieut. Peter, R. N. F. R. A. S. Author of some valuable Investigations into the Magnetic Properties of Iron Bodies.

Leyburn, Thomas, Esq., F. R. A. S. Professor of Mathematics, Royal Military College, Sandhurst, and for more than thirty years Editor of the Mathematical Repository.

Murchison, Rod. Impey, Esq., F. R. S. F. G. S. F. L. S.

Powell, Rev. Baden, M. A. F. R. S. Savilian Professor of Geometry, Oxford.

Prout, William, M. D. F. R. S.

Robinson, P. F., Esq., Architect, F. A. S. F. G. S. Author of the "Vitruvius Britannicus," "Rural Architecture," "Designs for Ornamental Villas," &c.

Stratford, Lieut. W. S., F. R. S. F. R. A. S. Superintendent of the Nautical Almanac.

Taylor, John, Esq., F. R. S. F. G. S.

Thirlwell, Rev. Connop, M. A. Fellow of Trinity College, Cambridge.

Wyon, William, Esq., Chief Engraver, Royal Mint.

PLATE 26.

Applegath, Augustus, of Crayford, Esq. Inventor of several valuable Improvements in Printing Machinery.

Barry, Sir David, M. D. F. R. S.

Blackwall, John, of Crumpsall Hall, Esq. F. L. S.

Brande, William T., Esq. F. R. S. Professor of Chemistry, Royal Institution, Superintendent of Machinery, Royal Mint.

Busby, Charles Augustin, Esq., Architect, Brighton, Author of "Designs for Villages and Country Houses," "Designs for Modern Embellishments," Inventor of an Improved Water Wheel, Improved Mode of Heating House, &c.

Challis, Rev. James, M. A. Author of the very masterly Report, read at the last Meeting of the British Association, on the Theory of Fluids, and of some previous Tracts on the same subject, distinguished for their mathematical ability.

Cheverton, Benjamin, Esq., Inventor of a very ingenious Carbonic Acid Gas Engine, Author of numerous valuable Communications to the Mec: Mag. and other scientific journals.

Cline, Henry, the late eminent Surgeon, founder of the *Clinical* System of Medical Instruction.

Conybeare, Rev. William Daniel, M. A. F. R. S. F. G. S.

Corbaux, Francis, Esq., Author of several esteemed Works on Probabilities.

Daubeny, Charles, M. D. F. R. S. F. L. S. F. G. S. Professor of Chemistry, Oxford, author of "Description of volcanoes."

Duncan, Philip B., Esq., M. A. Keeper of the Ashmolean Museum, Oxford.

Hall, Samuel, of Nottingham, Esq. Inventor of the Gas Singeing Apparatus, an Improved Steam Engine, &c.

Hamilton, W. R., B. A. Astronomer Royal of Ireland. St Andrew's Professor of Astronomy, Trinity College, Dublin.

Macartney, James, M. D. F. R. S. F. L. S. M. R. I. A. Professor of Anatomy and Surgery, Trinity College, Dublin.

Paganini, Nicolo, the celebrated Violinist.

Parry, Captain Sir W. E., F. R. S. the celebrated Polar Sea Navigator.

Pritchard, Mr. Andrew, Author of "Microscopic Cabinet," Inventor of the Jewel and Doublet Microscope.

Richardson, John, M. D. F. R. S. F. L. S. the Companion of Captain Sir John Franklin, in his North American Expeditions, Author of the "Zoology of North America."

Robinson, Rev. T. R., D. D. Professor of Astronomy at Armagh.

Sinclair, the Right Hon! Sir John, Bart. L. L. D. the founder and first President of the late Board of Agriculture, Author of the Statistical Account of Scotland, History of the Public Revenue, Code of Longevity, &c.

Smith, Mr. William, of Hackness, Engineer and Mineralogist F. G. S. the Father of English Geologists.

Syme, James, Esq., F. R. S. E. Professor of Clinical Surgèry in the University of Edinburgh.

Walker, Mr. W. C., Wood Engraver; executed the original sheet of Autographs from which the present plates are copied,—a favorable specimen of his skill in a most difficult branch of Xylography.

Watson, John Burgess, Esq., Architect; erected the New Parish Church of Staines.

Walker, Ebenezer, of Lynn, Esq., Author of many ingenious papers on practical subjects in Nicholson's Journal, Philosophical Magazine, and Mechanics' Magazine; constructed the reflecting Apparatus of Hunston Light House, the first on that principle introduced into England.

Wheatstone, C., Esq., Author of some very original Papers in the Journal of the Royal Institution, on the Vibration of Sounding Bodies; Inventor of the Æolina, Microphone, and other instrumental novelties.

PLATE 27.

Banks, Sir, Joseph, late President of the Royal Society.

Barton, Mr. John, Engineer, Inventor of the Metallic Piston.

Bostock, John, M. D. F. R. S. Author of "Elementery System of Physiology," and other valuable Scientific Works.

Bouvard, the able coadjutor of Laplace, in his Astronomical Investigations. "The immense calculations of Bouvard have detected every varying phasis of the law of universal attraction."—*Leslie.*

Brodie, B. C., Esq., F. R. S. Serjeant Surgeon to the King, and Surgeon to St. George's Hospital.

Brunel, Isambard Kindom, Esq., C. E. F. R. S.

Buckland, Rev. William, D. D. F. R. S. Professor of Geology, Oxford, President of the Geological Society, and Author of "*Reliquiæ Diluvianæ.*"

Burnet, Gilbert, Esq., Professor of Botany, King's College.

Clegram, William, Esq., Resident Engineer of the Gloucester and Berkeley Canal.

Costard, Rev. George, A. M. late Vicar of Twickenham, Author of the "History of Astronomy," and other esteemed Works on Astronomical Subjects.

Cousin, James Anthony Joseph, Author of "Traite du Calcul, Differentiel et Integral," and other valuable Mathematical Works: died 1808.

Deville, Mr. James, the famous practical Craniologist.

Downing, Mr. Samuel, Working Carpenter; the Author of some Letters in the Mec: Mag: on the Education of the People, remarkable for vigour of sentiment and elegance of diction.

Featherstonehaugh, G. W., Esq. F. G. S. Editor of the Monthly American Journal of Geology and Natural Science.

Franklin, Captain Sir John, R. N. F. R. S. Commander of the two Expeditions sent in 1819 and 1825, to determine the limits of North America.

Grooby, Rev. James, B. A. F. R. A. S.

Joynes, R. S. D. D. President of the Chatham and Rochester Philosophical and Literary Institution.

Keate, Robert, Esq. Surgeon to St. George's Hospital.

Lacroix, M., of Paris, Member of the Institute and Legion of Honour, Dean of the Faculty of Sciences, in the University of France; Author of numerous Standard Elementary Works on Geometry, Arithmetic, Algebra, &c.

Laplace, the Newton of France; Author of the "Mechanique Celeste," and "Exposition du Systeme du Monde;" Peer of France, President of the Academy of Sciences, and somewhile Minister of the Interior. Died 5th May, 1827.

"We cannot affirm that it was granted to him to create a science entirely new, as Archimedes and Galileo have done; to give to mathematical doctrines original principles, like Descartes, Newton, and Leibnitz, or like Newton, to extend to all the universe terrestrial dynamics of Galileo; but Laplace was born to bring every thing to perfection, to investigate every thing, to extend all the limits and to resolve what had been thought incapable of solution. He would have completed the science of the Heavens, if the science could be completed."—*Baron Fourier's Historical Eulogy.*

Lowry, Wilson, the late eminent Engraver.

Meyrick, Sir Samuel Rush, D. C. L. F. S. A. Author of "Critical Inquiry into Ancient Arms and Armour."

Oersted, Hans Christian, Professor of Natural Philosophy in the University of Copenhgen, and Secretary of the Royal Society of Copenhagen; Founder of the new Science of Electro-Magnetism.

Piazzi, of Palermo, the discoverer of the Planet Ceres.

Rigaud, S. P., Esq., M. A. F. R. S. Savilian Professor of Astronomy, Oxford.

Ross, Captain John, R. N. F. R. S. The first and last, and upon the whole most persevering and successful of the modern explorers of the Polar Regions; is supposed to have discovered, in his last Expedition, the exact position of the North Magnetic Pole; Author of Treatise on Steam Navigation.

Rumker, Charles, Esq., the late indefatigable Director of the Astronomical Observatory at Paramatta, New South Wales; was the first

to observe in 1822, the celebrated Comet of Encke, also the Comet of 1824.

Sabine, Joseph, Esq. M. A. F. R. S. F. H. S.

Stephenson, Robert, Junr., Esq. C. E. Sole Engineer of the London and Birmingham Railway.

Stevenson, Robert, Esq., C. E. F. R. S. E. F. G. S.; erected the Bell Rock Light House, next to the Tour de Corduan, the finest in the World.

Symington, William, late, C. E.; constructed the first Steam Vessel in Great Britain.

Somerville, Mrs. Mary, one of the profoundest Mathematicians (albeit her sex,) of the present age; authoress of the best summary of the astronomical labours of Laplace, which has yet appeared in the English tongue; first know to the Scientific World for some curious observations on the Magnetizing Power of the violet ray.

Venturi, Johannes Baptiste, the celebrated Italian Engineer; particularly distinguished for his successful investigations into the Motions of Fluids.

Wronski, Hoene, the Polish Astronomer; Author of a somewhat memorable Petition to Parliament " sur la spoliation d'un savant etranger par le Bureau de Longitudes des Londres."

PLATE 28.

Aikin, Arthur, Esq., F. L. S. Secretary to the Society of Arts.

Bakewell, Robert, Esq. Author of the excellent " Introduction to Geology."

Blore, Edward, Esq., Architect, F. A. S.

Cleland, James, Esq. Author of " Annals of Glasgow," and many other valuable contributions to Scotch Statistics.

Cunningham, Allan, F. L. S. Sculptor,—better known as one of the most popular novelists and general writers of the day.

Curtis, John, Esq., F. L. S. Author of " British Entomology."

Dalton, John, D. C. L. F. R. S. Member of the French Institute, the Founder, (if not originator,) of the Atomic Theory.

Dana, Samuel, M. D. Boston, U. S.

Dufresnoy, M. the distinguished French Geologist.

Ellis, Sir Henry, B. C. L. F. R. S. Sec. Soc. of Antiq. Principal Librarian to the British Museum.

Fowler, Charles, Esq. Architect; erected Covent Garden and Hungerford Markets.

Gautier, Dr. Alfred, of Geneva, Author of a valuable Historical Essay on " the Problem of the Three Bodies."

Granville, Augustus Bozzi, M. D. F. R. S. F. L. S. Physician Royal Metropolitan Infirmary.

Guthrie, George James, Esq., F. R. S. President of the Royal College of Surgeons.

Henning, John, Sculptor and Medallist; executed the beautiful miniature copies of the Elgin Marbles, the frieze of the Athenæum Club House, &c.

Herschell, Sir William, the late Illustrious Astronomer; discoverer of the planet, which he called, in honour of his Royal patron, George the Third, the *Georgium Sidus*, but now more commonly known

by the name of *Uranus;* discovered also the sixth and seventh satellites of Saturn.

Heurteloup, Baron, the celebrated Lithotritist; received in 1833, from the French Academy of Sciences, the first prize in surgery, (6000 francs,) for his discoveries in Lithotrity; created also Knight of the Legion of Honour.

Hope, Thomas Charles, M. D. F. R. S. L. & E. Professor of Chemistry, Edinburgh; the discoverer of Strontian.

Hawkins, John Isaac, Esq., C. E.

Jones, Dr. Thomas P. Superintendent of the Patent Office, Washington; Editor of the Franklin Journal.

Kater, Captain Henry, F. R. S. Inventor of the Convertible Pendulum, and Author of numerous Papers in the Transactions of the Royal Society, describing Experiments made with it to determine the Figure of the Earth.

König, Charles, Esq., Foreign Secretary to the Royal Society, and Keeper of Nat. Hist. British Museum.

McKonochie, Captain Alexander, Professor of Geography, London University, and Secretary of the Royal Geography Society.

Riddle, Edward, Esq., Master of the Mathematical School, Royal Naval Asylum, Greenwich, Author of "Treatise on Navigation and Nautical Astronomy."

Robison, John, Esq. Sec. Roy. Soc. Edinburgh.

Rutter, J. O. N., Esq., Inventor of the New Mode of Generating Heat, from Water and Tar, Author of Practical Observations on Gas Lighting.

Sabine, Captain Edward, Sec. R. S. one of the Resident Committee at the Admiralty, for advising on Scientific Subjects; Author of "Experiments to determine the Figure of the Earth," for which he was awarded the Lalande Astronomical Prize, by the French Academy of Sciences.

Sedgwick, Rev. Adam, M. A. F. R. S. F. G. S. Woodwardian Professor of Geology, Cambridge.

Stephenson, George, Esq., C. E.; executed the Liverpool and Manchester Railway, and Sole Engineer of the Grand Junction Railway, between Manchester and Birmingham.

Sturgeon, Mr. William, of Woolwich, a Practical Electrician, and Philosophical Lecturer, of well merited eminence; originally a private bombardier of the Royal Artillery.

Thomson, Thomas, M. D. F. R. S. F. L. S. Professor of Chemistry, Glasgow.

Travers, Benjamin, Esq., F. R. S. Surgeon to St. Thomas's Hospital.

Turner, Edward, M. D. F. R. S. L. & E. Professor of Chemistry London University, Sec. Geolog. Society.

Waterton, Charles, of Walton Hall, Esq., Author of "Wanderings in South America, &c."

Watkins, Mr. Francis, Philosophical Instrument Maker, Author of "Popular Sketch of Electro Magnetism."

Young, Mr. J. R. Professor of Mathematics, in Belfast College, Author of Elements of Geometry, and numerous other Mathematical Works of great merit. *Mech. Mag.*

METEOROLOGICAL TABLE, KEPT AT DINAPORE, ...

Days.	Moon's Changes.	Self registering Thermometer. Minimum.	Thermometer, in the shade. Sunrise.	9 A. M.	Noon.	3 P. M.	9 P. M.	Daily range of Thermometer.	Difference between wet and dry bulb Thermometer. 9 A. M.	3 P. M.	Rain in inches.	Winds. A. M.	P. M.	Remarks. Night.	A. M.	P. M.
1		80·2	80·6	85·7	89·7	91	89	10·8	5	12	,,	E.	N.E.	Fine.	Cloudy.	Clear and fine.
2		82·3	82·6	86·6	90	93·3	88·6	11	6	11	,,	E.	N.E. light.	Ditto.	Ditto.	Ditto.
3		83·6	84	87 7	90	90·7	92·3	8·7	8·5	15·5	,,	W.N.W.	W.N.W.	Ditto.	Ditto.	Cloudy.
4		85	85·4	82·2	91·5	87·3	82	6·5	7	5	0·14	E. light.	N.E. light.	Ditto.	Light Clouds.	Th. storm. & rain.
5	☽	79·8	81 3	86·5	89·4	89	84·2	9·6	4·5	7·5	0·01	N.E.	W. Ditto.	Ditto.	Cloudy,	Slight rain. Cloudy.
6		80·8	82	89	92	93·5	88·5	12·7	12	18	,,	W.N.W.	W.N.W.	Ditto.	Hazy.	Hazy.
7		82	83·6	91	94	95	90·8	13	17	23	,,	W.N.W. hot.	W.N.W. hot	Ditto.	Ditto.	Ditto.
8		84·3	84·3	91	94·2	96	92	11·7	9	23	,,	N.E. light.	Ditto. Ditto.	Ditto.	Ditto.	Ditto.
9		84	84	87·3	92·7	94·7	93	10·7	5·5	19·5	,,	E.	W.N.W. Air.	Ditto.	Cloudy.	Light Clouds.
10		81	81·5	87·1	92	93·7	88·4	12·7	7·5	16	,,	Ditto.	Ditto. light.	Ditto.	Light Clouds.	Ditto.
11		81	81	89	93·5	96	92	15	11	23	,,	Ditto.	N.W.N.	Ditto.	Clear and fine.	Clear and fine.
12	○	82·4	82·4	88·4	92	94·5	92·8	12·1	6·5	16	,,	Ditto.	N.	Ditto.	Hazy.	Hazy.
13		83	83·3	88·6	92·6	94·6	92·4	11·6	7·5	18	,,	Ditto. strong.	N.E.	Ditto.	Ditto.	Ditto.
14		84	84·4	89 2	94·1	94·5	93·4	10·5	11	16·5	,,	E.	S.E.	Ditto.	Clear and fine.	Cloudy. [5 P.M.
15		86·4	86·7	88·4	94·2	95·8	88·2	9·4	9	16	,,	Ditto strong	E.	Ditto.	Cloudy.	Thunder storm at
16		84·3	85	90·5	94 2	95·8	87	11·5	10	14·5	,,	Ditto light.	E. strong	Ditto.	Light Clouds.	Cloudy.
17		83	83	90·2	93	95·7	91·4	12·7	8	12	,,	E.	N.E.	Ditto.	Day clear and	fine.
18		82·5	83	87·7	94·2	95·5	86·8	13	8	12	,,	E.S.E.	E.S.E. strong.	Ditto.	Ditto.	
19		82·2	82·8	87	93·6	95·5	88·3	13·3	7·5	12·5	,,	E.	E. strong.	Ditto.	Cloudy.	Clear and fine.
20	☾	82·8	83·4	85·4	92·4	94·5	88·6	11·7	5·5	13	,,	Ditto.	N..E	Ditto.	Light Clouds.	Cloudy. [P. M.
21		83·8	84·3	89·8	94	94·3	85	10·5	8·5	15	0·01	Ditto.	N.W.	Ditto.	Cloudy.	Thunder storm. 4
22		81	81·5	88	89	90·1	91·1	9·1	6	10·5	,,	N. Air.	N. Air.	Ditto.	Ditto	Cloudy.
23		84	84	89·5	92	95	92·7	11	11	13	,,	W.	Ditto.	Ditto.	Ditto.	Ditto.
24		81·2	83	88·5	91	93·5	86·7	12·3	8·5	13	0·01	E. light	S.	Ditto.	Ditto.	Ditto. [rain.
25		82·4	82·7	86·6	88·6	84·4	80·8	7·8	6·5	4·5	0·21	E.	E.	Ditto.	Ditto.	Thunder storms
26		77·4	78	83·8	86·4	78·7	80·4	9	4	2	1·35	Ditto. light.	S. squally.	Rain.	Ditto.	Ditto. [showers.
27		79·2	79·5	84·7	85·4	85·4	83·2	6·2	3·5	4	0·03	Ditto.	W. light.	Fine.	Dark & Cloudy.	Dark & cloudy. Lt.
28	●	80·3	80·6	86·2	88·3	87·8	85	8	4	6·5	0·27	N. light.	W. Ditto.	Ditto.	Cloudy.	Showers of rain. thun-
29		80·3	81·3	86·7	90	90·4	79·6	10·1	7	10	0.28	W.	W.	Ditto.	Light Clouds.	Ditto. [der
30		74	80	84·8	87	89·4	81	15·4	4·5	6·5	1·11	W.	N.E. light.	Th. storm. rain.	Th. storm.—rain.	Cloudy.
Mean		81·9	82·6	87·7	91·4	92·1	87·8	10·9	7·6	12·9						

Minimum........................ 81·9 }
Medium......................... 87·7 } Mean.
Maximum........................ 92·1 }

{ Difference of wet and dry Bulb Thermometers....... 10·2
{ Temperature for Quarter.... 83·6

S. M. Ll.

Dinapore, 1st June, 1843

From an original sketch by C.O.M.
C.G.

CHRISTOPHE
or Henry the First, King of Hayti.

THE

INDIA REVIEW.

JULY.] —o— [1843.

ORIGINAL COMMUNICATIONS.

Circumstances with which it is unnecessary to trouble our readers, have rendered it impracticable to present the usual Portrait and Notice of a living Worthy in our present issue; but in the prefixed representation, from the pencil of a lady, of the celebrated Christophe, King of Hayti, and the interesting Memoir of events connected with the life of that remarkable man, we are quite sure our readers will find an ample compensation.

RECOLLECTIONS OF

Christophe, or Henry the First, King of Hayti.

The writer whose recollections of the above named remarkable individual are here detailed, was appointed Classical Professor and Chaplain in the College of Hayti, in the year 1817, having been selected and recommended for the office by the late Wm. Wilberforce, Esq., the ever-memorable friend of the African slave, the fearless and uncompromising enemy of African oppression, the equally humane and eloquent advocate of the rights and claims of the victims of selfish cupidity and tyrannical power. He had, of course, during a residence of more than eighteen months, large opportunities for acquainting himself with the state and character of the emancipated Negroes, their Ruler and Nobles; for with many of these he was intimately acquainted by personal communication, as well private as official. Still the long interval, of the six and twenty years which have since elapsed, has thrown the thickening shades of forgetfulness over the memory of many scenes vividly impressive at the time, but now more or less indistinctly retraced. The life of the writer, both before and since, has been a varied and busy one: he has travelled over many countries, lived in many climes, and conversed with men of many nations, differing in colour and civilization; with the red Indian of America, and Sable African; the sallow Chinese and bronzed Malay; the sooty Malagash and Ceylonese; the many-coloured inhabitants of Hindustan; the variously tinted French, Dutch, and Portuguese of continental Europe: with all these it has fallen to his lot to mingle, and to visit most of them on their own soil, and in their own homes. Much among them all has he seen and heard and felt pleasing and painful, humbling and consolatory, horrifying or hopeful, engaging or soothing by turns. Every where has he found man generically the same identical being, in all the great physical characters and moral outlines of his nature: every where capable of, if not fully enjoying, the advantages of education, civilization, refinement, moralization and religion; when destitute of these, equally and alike everywhere capable of the same physical, mental and moral debasement, enervation

and corruption : in all countries, under every sky and in every stage of advancement or deterioration, possessing the same elementary powers which form the springs and instruments of individual and social and religious movement, action, and character. Varied and deep are the feelings that rise in his mind in reviewing the past, and endeavouring to recal passages of reality long since become nearly as shadows, or as the visions of an imagination once lively but now deadened by the sad and sober verities of an actual life of change, sorrow and anxiety. Some impressions, however, are yet vivid as in their first freshness, and these he gives simply as they present themselves to memory.

It is not my purpose to enter into the previous history of St. Domingo. This fine Island, well termed by the French, " The Garden of the West," and " The Queen of the Indies," was discovered in 1492 by the daring and adventurous Columbus. Its population was then, as is estimated, above a million ; " *At least* a million," says Robertson. But—they were reduced, by European avarice and cruelty, to 60,000 in the short space of fifteen years ; and 40,000 Lucayans were entrapped to recruit the wasted indigenous population ! At length, under the direction of misguided humanity in Las Casas, the kidnapped sons of Ham were introduced into the West Indies. In most of the Islands, the original Red Indian Caribbean or other indigenous population has been annihilated, and has actually disappeared from the face of the earth ; some small remnants only yet drag out a feeble existence here and there: in St Domingo, it is believed. not a single family of pure Indian blood is to be found ! They melted away like wax before the fire, worn out by unwonted toil in the mines. under European task-masters, or hunted down by blood-hounds when they resisted ! The use of blood-hounds was introduced by the most worthy ancestors of the most Catholic Spaniards, who employed them in their wars with the defenceless natives, and continued so late even as the commencement of the present century. The present inhabitants are the creole Spanish, with a very small amount of Creole French, and their descendants ; originally imported or Creole i. e. Island-born Africans, and the variously mongrel offspring of these several classes.

The term Mulatto denotes a mixed European and African, that of Mestizo one of half European half Indian blood. In the North Western portion of the Island, forming the kingdom of Hayti, of which only I shall now speak, the entire population consisted, in 1818, of Blacks and Mulattoes, so termed, (the latter much the smaller division of the two) of various shades and in different proportions of mixed blood. The mutual jealousies of these classes had led to the separation of the North Western portion or *kingdom* of Hayti under Christophe, from the South Western or *Republic* of Hayti under Petion. The whole of the Eastern portion was still under Spanish domination. The entire Island now forms but one Republic, lately under the Government of Boyer, Petion's immediate successor ; but again, on his expulsion, a prey to the evils of contest for dominion. From the kingdom of Hayti all the remaining French had been banished, and the landing of a Frenchman was in my time absolutely forbidden. To set foot on Haytian ground was to make himself a criminal and subject himself to legal penalty. To any one who has read the history of the revolutions of Hayti, of the virtuous but unfortunate Toussaint L'Ouverture, of

Rochambaud and Leclerc, with the proceedings, excesses and sufferings of the French army, and who has had but a little insight into the horrors of slavery under the old regime, it can be small matter of astonishment that a Frenchman should have become identified in Hatian imagination and parlance with every thing most bloodthirsty and abhorrent, everything most selfish and murderous, most deceptive and cruel. Time only can wear down those prejudices which long oppression first engendered, and make the proper distinction between a nation and individuals, or between the same people at different periods of their history and under different political influences or social circumstances.

The population of the *kingdom* of Hayti was calculated not to exceed 250,000 in 1816. The revolutionary desolations had greatly thinned it.

Passing over, as irrelevant to my immediate object, and demanding too great detail for the pages of the 'India Review,' further general observations, I proceed to remark on the personal history, character and acts of Christophe, and on the state of Hayti under his government.

Henri Christophe is said to have been a native of St. Christopher's. He was of a fine clear and bright coffee-colour, of middle stature, well built, with marked African features but pleasing and benevolent expression. He had been a soldier with and under Toussaint L'Ouverture, in the wars with the colonists. His courage and ability quickly advanced him to distinction ; and at the time of the declaration of Hatian independance, after the retirement of the skeleton of Leclerc's and Rochambaud's murderous and ill-fated army, was third in command of the army of Hayti. Dessalines was first, who being a man of daring intrepidity and almost ferocious courage, and having secured the suffrages of the influential men under his command, was elected Ruler of the new state with the too magnificent title of James the 1st Emperor of Hayti. His subsequent assassination on the way to Port-au-Prince, opened the way for the advancement of Christophe, who was proclaimed under the less imposing and more suitable style of Henri the 1st, King of Hayti. He was wholly illiterate, scarcely possessing more of education than to be able to read and to affix his written signature to state documents ; yet were his natural abilities good ; and such, had they been cultivated, as to have ensured a very respectable progress in any of the usual branches of study. He was remarkable for shrewd good sense and quickness of perception ; was a good judge of men, and by long observation had acquired a deep insight into human character. That he judged well and wisely, is sufficiently attested by the choice he made, amongst the candidates for office, of those best qualified by ability and acquirement to discharge the duties which were assigned to them. That he knew also how to secure the zealous services, and even the devoted attachment, of his ministers and other employés, is matter of history. During the whole of the long period of stirring change in which his career was run, no man who attained any high degree of power, Toussaint L'Ouverture himself not excepted, was served with more warmth of personal attachment or a profuser display of public zeal. Till the last fatal Revolution of 1819, none of those of note immediately about his person

had proved faithless to his interests. Yet among these were men of all shades of colour, from the glossy pitch of the aboriginal African, through every intermediate tint, to the sickly pale of the first remove from the pure European. Of his troops he was ever paternally careful; they had good quarters, good food, and the best supplies that money could procure of medical stores and attendance; to each man, also, was assigned a certain portion of the soil, which, when public events permitted his personal absence, he was permitted to work himself for his own benefit: usually however, his wife and children, were the cultivators. The dress of Christophe's army was on the European (French) model as to cut, colour, &c., with only the absence of such appendages as the climate rendered not only unnecessary but an incumbrance, stockings, stocks, &c. He was a strict disciplinarian; punishments were summary and somewhat severe, but he had been trained himself in troublous times; and the history of man has always shewn that those who have been treated themselves with severity become severe in their turn. No greater tyrant to the slave than a slave who has become a master; and the victim of the *martinet* becomes himself a martinet when in command. This also may be alleged with truth and justice, as Christophe was himself wont to say, in mitigation of the charge of severity, if not of cruelty—"Enfin, que voulez-vous, &c." i. e. How would you have me act? Do you not consider the materials I have to work with? Do you not see that the rules of judgment applicable to the sovereign of a long civilized people under a settled Government, whose national character has been moulded by immemorial institutions, whom education has enlightened and religion moralized, who are accustomed to the moderated and wholesome restraints of regular Government, must be very different from those applicable to a people just emerged from the most degraded condition in which men have ever existed; let loose without preparation and precaution from all the grinding oppressions of a debasing slavery; with few ideas above those exercised upon the wants of the body; with strong animal propensities, and unused to any check or controul of conscience, reason or religion; unsoothed by kindness, accustomed to deeds of cruelty and infancy, at once the instruments and the victims of a remorseless and selfish slave-holding exotic aristocracy? How are such men to be ruled but by a strong arm and a firm employment of coercive power &c.? Thus he was accustomed to argue and not without strong colour of reason. In such a state of society as must yet have existed, it is not to be wondered at, however it may be deplored, that secret punishment, too, was occassionally resorted to under his administration. For intrigue was encouraged both by Frenchmen without, and the partizans of Republicanism within: and no doubt, also, there were, as the event proved, secret exceptions to the general attachment and fidelity with which Christophe was served. It could not, indeed, fail to happen, that amidst the turbulent and restless heavings of the revolutionary volcano, the workings of the elements of mischief should develope themselves in combination with the materials of universal good; it could not be, but that some, when the Government had assumed a tranquil and settled form, should deem themselves neglected in the distribution of honours and places; that here and there an ambitious individual should find himself in small consideration who had even fancied himself competent to wield a sceptre and to wear a crown; and that the suppression of

those secret cabals or open commotions to which disappointed hopes and mortified aspirings had led, should occasionally seem to demand a promptitude and secrecy and severity which, in other times and under other circumstances, would not have been willingly resorted to; or, if employed, would have deserved the severest reprehension and retribution. During my own time in the Island, towards the middle of the year 1819, when already the quick accustomed ear caught the distant and faint murmurings and first almost imperceptible vibrations of the coming revolutionary heavings, I have stood at my casement or in my balcony in the faint moonlight, listening with breathless attention to the tread, as it fell in the distance, of the night party moving from street to street, stopping at the homes of the implicated or suspected to carry off one or another individual to the citadel, whence they returned not; being, as was believed, there subjected to secret examination and punishment undivulged. Happily these were rare occurrences, and possibly might be justified by the circumstances of the times; at all events they were certainly not the natural results of a gloomy, malignant or cruel temper in the Negro King, of which I could cite numerous proofs; one or two illustrations may be acceptable.

I have said that Christophe was ever attentive to the health and comforts of those who fought his battles. Many of these, who had shed their life-blood in his service, had left Orphans; who, but for the just and humane consideration of the king, must have been exposed to encounter the chances of misery and starvation in a country devastated by fire and sword, without, it might be, a surviving relative to shelter and protect them. This Christophe himself did; they were nourished at his expense; nay, were treated by him with such fatherly care and tenderness, that when he walked the environs of his court a number of them would gather about the person of their good Papa, as they called him, running to search his pockets for the bon-bons which they were sure to find there, intended for their enjoyment. This was no ambiguous indication of an amiable and kindly heart.

On one occasion, my brother Professor, Dr. Stewart, was sent for to bleed one of the Princesses. The king was present, and assisted in the bandaging of the arm &c.; presently the Doctor desiring one of the attendants to hold the basin, Christophe himself seized it; and when the medical functionary, scandalized at committing so humble an office to royal hands, would have respectfully taken it from him, his majesty replied in a voice and tone of natural feeling—Ah! lasissez-moi tranquille: je suis père! "Let me do it, let me do it; I am a father!" Nothing, sure, could be more true to nature or manifest a more genuine kindliness of disposition; yet this man has been described by some as a person of furious temper, indulging in gusts of passion comparable only to the tornado of his native seas! I never heard a whisper of any thing of the kind amongst his people, nor ever saw any thing that could give countenance to such an assertion; but I both heard and saw much, very much, that was utterly irreconcilable therewith.

In the distribution of offices Christophe was prudently impartial; everywhere Blacks and Mulattoes of every shade shared in the honours and emoluments that rewarded merit. If the latter predominated in his counsels or held the chief places of trust and confidence in the ministry,

&c. it was unavoidably so; since among them only, for the most part, were to be found men sufficiently educated to carry on the business of Government. The Blacks had mostly been field-slaves, and of course were wholly illiterate: yet even of them many, who had shown skill and conduct in war, were in command of regiments or fortifications, and invested with some of the highest honours; of these was the Duc DeMarmalade, a native-born African, as black as a coal, and as ignorant of every thing but sugar-cultivation and war as a savage; still, he was not only a Duke, but Governor of the Capital, and a man in whom Christophe placed much confidence. Yet was he among the conspirators who put an end to his life and reign! moved, it is probable, only by that uneasy jealousy in the bosoms of the Blacks, of which the Mulattoes were ever the objects, enforced by a policy that led him to cleave to the rising power. The Mulattoes were, very many of them, the sons of Frenchmen of rank, and had received a more or less extended education in France or America. The French Planters were often of noble family, whose off-sets found promotion in the colonies: and their children, especially the sons, of the half-blood, were usually sent to school in France. Hence the number of individuals of this class who held distinguished office both under Petion and Christophe. In fact they were almost the only class from which competently qualified individuals could have been selected. Among these were the Comte DeLimonade, minister for the foreign department, the Baron DeDupuy, Secretary-Interpreter, and the Baron DeVastey, Secretary to the King and Tutor to the King's sons, &c. These were all men of first rate ability and excellent education. The state papers of DeLimonade, the business tact of Dupuy, and the published writings of DeVastey prove them to have been men of mind and energy. The Baron Dupuy was educated in America, spoke and wrote English well, and was yet in the ranks when, on some occasion during the period in which the English army were at Cape Tiburon, an interpreter being required, proclamation was made on the field for any one who knew English to come forward; Dupuy stepped forth, and being found highly qualified was rapidly promoted to fill posts of the first importance. He was thoroughly versed in all the arts of diplomacy, a man of council and a courtier, and greatly liked by those with whom he had much to do officially, the foreign merchants and others. I found him ever kind, courteous, prompt, and candid to the last. He is still in office, and a general, but divested of his *nobility*, under the existing Republican regime.

The adoption of the regal form of Government entailed all the etceteras of a titled, endowed, expensive and privileged aristocracy, with all the glitter, formal etiquette, and expensiveness of Royal courts. Princes, Dukes, Counts, Barons and Chevaliers formed the gradations. Titles and estates were hereditary in the eldest son or next of kin in the male line, as under the monarchies of Europe. A Royal almanack exhibited the whole in true European Court Almanack style, regularly marshalled: first the Royal family, next the nobility, then the officers of state, the Household &c.; next the Army Staff, Field Marshals, Knights grand crosses, &c. Generals, Colonels and the rest downwards; then the various institutions, public courts, Judges, Pursuivants, and the whole etcetera of civil offices. Among the army was a body of mounted Amazons, dressed in sky-blue and white, but riding a-straddle,* and using bows

and arrows; a grotesque exhibition, intended probably more for shew than service, designed to amuse a barbarous taste and give the ladies' wits and activity a peaceable and harmless direction away from the risks of scandal and cabal.

There was a code of laws drawn up with the aid of an intelligent Frenchman, a Monsieur Richet, whom I knew, and the only one in the kingdom; it was modelled on the Code Napoleon, was termed the Code Henri, and on the whole exhibited a good sense, providence and tact beyond what could have been expected. The Judges were gravely dressed personages, nominally irresponsible; though, not being much exercised in the arts of law and science of justice, requiring, of course, to be a good deal directed and quickened by the occasional application of royal flappers somewhat arbitrarily employed at times. Still, in this as in every thing else, it seemed to me as if all that could have been done had been done: time and experience are required to mature the best planned institutions and qualify the best intentioned officials, as well as to give a distinct form and character to national mind and usage.

Education was, after all, Christophe's grand dependance for internal improvement; and he was right. He held frequent intercourse by letter with Mr. Wilberforce, Mr. Stephen the master in Chancery, Zachary Macauley and others, whom I knew, and all of whom were the tried friends of the African slave. Under their advice, and with their aid, he matured his plans for educating and civilizing his people; and I believe in my heart with as pure and upright intention as ever actuated the best of reforming monarchs, Peter of Russia, the late Frederick of Prussia, or Joseph the 2nd of Austria not excepted. Like them he may have erred in judgement, been arbitrary in procedure, or severe sometimes in action; but I firmly believe he laboured honestly and zealously for the national welfare. It formed at one time a favourite object with him to introduce the English language and the Protestant faith. Partly to this end he established primary Schools on the Lancasterian system, in the great towns of the kingdom, Cape Henry, St. Mark's, Gonaïves, &c.; had teachers on good allowances, books &c. sent from England; and finally instituted the Royal College, endowing it with three professorships of Mathematics, Medicine, Classical and general Literature. To the last of these, I was appointed, as before stated, on a salary of 2,000 Spanish Dollars a year and a house: which, on my arrival, he augmented at once to 3,000, and gave me one of the best houses in the City. His Schools and College were not *class* institutions; the pupils were taken from *all* grades of society, the highest and lowest alike, and indiscriminately; the King's nephew, a son of the late Emperor Dessalines, the sons of Princes, Dukes and other nobles were there, side by side with the sons of carpenters and petty tradesmen; all such as had qualified themselves in the lower schools were admitted into the College, and all stood the same chance there with their fellows of whatever grade. Christophe's object was to educate not a class but his entire people, and to give full scope for the development of talent wherever it existed. No expence was spared in the supply of Books, Globes, Charts, Instruments and other requisites; whatever was wanted was sent for from England, or purchased on the spot, if obtainable. The

Board of Public Education appointed its members visitors in rotation, to examine and report upon the progress of the pupils, and to consult and aid the teachers and Professors. True, all was modelled very much on the military system; this was a natural, perhaps inevitable, result of the spirit and condition of the times. Never, however, under the Negro King Christophe was there seen such wanton and monstrous exercise of arbitrary power, so grotesque as well as tyrannical an exhibition of the *sic volo sic jubeo* principle as we have lately been edified to find exemplified under the *paternal* rule of the Caucasian Cæsar, the *legitimate* Nicholas, autocrat of all the Russias! On this subject I avail myself of impartial testimony, that of W. H. Harvey, Esq., of Queen's College, Cambridge. author of "Sketches of Hayti" published in 1827. This gentleman was in Hayti nearly eight years subsequently to the time of my departure, and having no personal knowledge of the writer of these recollections, must of course have gathered his information from facts of notoriety. I adduce his testimony not, indeed, without a laudable self-gratulation, but with a special view to vindicate the claims of Christophe to the gratitude of the Haytians, to the esteem of good men, and lovers of their kind everywhere.

Extract from Chapter IX. of "Sketches of Hayti, &c."

"It was resolved that another establishment should be founded, denominated the Royal College—an appellation perhaps somewhat misapplied, the Institution being similar to the Grammar Schools, or to the more respectable academies, in England. A proposal was made to several English gentlemen, inviting them to Hayti to superintend the Institution, and offering them a liberal remuneration for their services; which proposal was accepted. and thus the College was established without difficulty or delay. A considerable number of the Haytian youth were now instructed in Latin, English and French composition, History, Geography and Mathematics, and were assisted in these pursuits by tutors whose attainments fully qualified them to direct their studies. The Classical Professor, (the Rev. W. M.) on whom at first devolved the entire charge of the College, devoted himself to a task at once laborious and irksome, with the utmost zeal and diligence. He strove to simplify his instructions, so as to render them intelligible to the lowest understanding; he varied his method of teaching according to the different capacities of his pupils; he assisted them in their difficulties and encouraged them by his mildness and persuasions; and, being a Clergyman of the Anglican Church, he added to his daily engagements that of instructing them in the doctrine and precepts of the Christian Religion."

* * * * * * * * * *

Under the tuition of these instructors, the students made considerable advances in those branches of learning to which their attention was now directed. The majority were able, in a short time, to construe the more easy Latin Authors without much difficulty; they wrote English and French with ease and correctness, and they especially delighted in the study of History and Geography, &c.

During the period that the late Sir Home Popham was attached to the Jamaica station, he paid occasional visits to Cape François, (Cape Henry) the special object of which there will be occasion to mention hereafter. On the last of these visits to that place, whilst on his return to England, he made particular enquiries respecting the College, and went in Company with Baron Dupuy to see it. He was exceedingly pleased at observing the order and regularity with which it was conducted, and was still more gratified with the evident progress of the students.

Under these circumstances education was rapidly advancing in Christophe's Dominions; its beneficial effects soon began to appear; and time only was required to render its influence more extensive and lasting."

As to the mental power of the Mulatto and Negro race, I deem

myself fully competent to speak, having had special opportunities for putting it to a satisfactory test; I am convinced, apart from all antecedent theory, prejudice, superstition, or whatsoever it may please theorists to designate the persuasion of the common origin and equal natural capacity of all mankind, that the God who "made of one blood all nations of men to dwell on all the face of the earth," has exercised no partiality in his dispensation of the gifts of intelligence and moral power. I have been engaged in teaching from an early age, and have had large numbers of pupils of many different races under my instruction; yet never, I can honestly say, never have I witnessed more quickness of apprehension, more diligence of application, or greater rapidity of progress than in Hayti. There I had, as before observed, pupils of all shades of colour, ages and grades; among them were found, of course, very various degrees of capacity and various ratios of corresponding progress. But, considering all the circumstances, I had abundant reason to be satisfied, in some cases even highly gratified and delighted. The preceding extract is proof that difficulties of no small magnitude had to be surmounted. Several of my text-books, in fact, I had to compose on the spur of the occasion, to prevent loss of time in procuring others from England. I had to teach English and French, Latin and Greek, Geography and History, Ethical Science and religious truth; to lay the very foundations of knowledge in some minds, wholly vacant; to build, in others, on those partially laid before in the Ecole Primaire in existence at the period of my arrival. Yet, zealously seconded by the authorities, the Board of Public Instruction, and the Parents of some of the pupils, and most materially favoured by the singularly amiable disposition, docility, and thirst for improvement of some of the elder scholars, I was even astonished at the results that began soon to be realized. I hope to be pardoned for giving a specimen or two of the proficiency and attachment of some of those dear youths. The writer of the following letters was particularly remarkable for an affectionate temper, gentle disposition, amiable and even elegant manners; for docility, moral feeling and good conduct; and I have a real pleasure in doing honour to this good young man. Nor will his ability be less apparent than his amiable character, when it is recollected how very short a time he had been learning English when the letter No. 1., which was the spontaneous outpouring of his feelings, was written; not perhaps, on the whole, above twelve months, and that while pursuing various other studies as well. Nos. 2. and 3 were written in French, two and three years respectively after I had left the Island. Though, properly speaking, private expressions of amiable attachment, they all speak too good a heart to be kept secret, especially when I am illustrating the character and operation of Christophe's Government and Institutions.

No. 1. (In the Original English.)

Cap Henri, January 1st, 1819.

Reverend Sir,

I should think myself wanting in my most essential duty if I omitted, at the beginning of this year, to renew to you the assurance of my most profound respect, and my most sensible gratitude.

Accept then, reverend Sir, the ardent wishes which I take the power (liberty) of expressing to you, for your perfect health, and the accomplishment of all your desires.

May Heaven, reverend Sir, prolong your days for the happiness of your family, and especially for me; and may they, as they glide on, be filled with comforts and tranquillity. Give me leave, at the same time, to devote to you all the impulses of a heart which owes to your virtuous example and to the instructions that you have bestowed on me, all the sentiments of which it is susceptible.

These are advantages for which I can never sufficiently thank you. I entreat you to believe that I will every day make new efforts to deserve your kindness' continuance, and to shew you by my respect and affection, the perfect submission with which I am,

Most Reverend Sir,
Your very humble, and most dutiful servant,
JAMES EMANUEL.

P. S. I feel myself at a loss in not being present to discharge this (duty) of my own organ. (He means, *viva voce.*) Pray don't laugh at my bad grammar.

No. 2. (Translated from the French Original.)

Cape Haytian, 20*th Feby.* 1821, *year* 18*th (of Independance.)*

My dear Sir,

I have had the sweet satisfaction of receiving the letter which you addressed me through the Capt. of the Janet. I was convinced you would not make a lengthened stay in America, because of the state of your health. Capt. N—informed us of your departure for Europe. I am delighted that you have reached it in safety, with your family, and trust you will soon recover your usual health. I wrote you in 1819 by Capt. N., who informed me he had forwarded my letter; but apprehend it has not reached you, since you make no mention of it. I began, indeed, to fear you had ceased to think of me.

Your present favour, however, has been a restoring balm to my heart; it brings back to memory the happy time I passed in daily intercourse with you. Alas! when will such a time return to me! I regret to inform you that my school companions, far from advancing, are now only losing what they had acquired under your tuition. It is not to flatter you to say that you were just the master we required. This is the general sentiment also as well as mine. As to myself, you are aware I left the College almost at the same time with you, and I continued only seven months in charge of the school at Sans Souci. Thence I returned to the Cape, where I commenced the study of Spanish under an excellent teacher from Caraccas; and though making sensible progress when the revolution broke out, you may judge, Reverend Sir, how slender are my attainments. It is, in fact, still you to whom I am indebted for all I know of general grammar, &c. The political changes which have taken place have, however, no wise diminished my love of knowledge or my resolution to pursue its attainment: for although we have no longer any public school, I apply myself at home to study, reading and writing exercises, &c.; nor do I neglect, believe me, the moral counsels you had traced out for me. I daily employ myself in religious duties and derive both enjoyment and advantage therefrom. I am fully convinced it is not enough, as you often told us, to be men, endowed with reason only; we must also be enabled to distinguish ourselves from the irrational creatures by piety and virtue, and to become examples to those around us who are ignorant of the doctrine of eternity and of the blessed rewards which God has laid up in Heaven for his servants. To impress my own mind with these things, I take the Holy Bible for my companion, that manual of the ancients and the best gift of God to men. I often repeat the Hymns you taught us to sing. Yes, you acquitted yourself worthily of your duty towards us; for, as the Proverb says, "instruct a wise man and he will become wiser still; teach a virtuous man and he will increase learning;" so you strove to stimulate our continued exertions in the ways of improvement.

I have informed you, I think, that Papillon was school-master at Port de Paix, afterwards at the Cape; and Theodore Duchène at Saint Marc; I also acquainted you with the death of Emile Almanjor (a young Baron and former pupil at the College) and with several other circumstances that have occurred since you left us.

General (previously the Baron) Dupuy, to whom I communicated your letter, has requested me to thank you for your kind remembrances, and also charged me to present both yourself and Madame with his compliments. My companions Bottex, Papillon, Vital, Marcadieu, Desmanglés, Jean Felix (a nephew of Christophe's) &c., in short all your pupils beg you to accept the assurance of their good wishes and prayers, which they put up to the Eternal for your prosperity. Finally, please offer my respects to your lady and children; and let me hope, my dear Sir, to hear from you soon. Think sometimes, Reverend Sir, of him who will be, all his life long,

Your devoted servant,
JAMES EMANUEL.

No. 3. (Translated from the Original French.)

Cape Haytian, 10*th April*, 1822.

Dear and Reverend Sir.—Your kind letter of the 8th of October last, I have received. I am truly sorry I am *unable* to express to you how much it has gratified me, especially in that its arrival has certified me of your well-being and that of your respected Lady, as also of my young friends F. and S. (the children of Mr. M.) who must by this time be able to speak well.

We are here passably well; several of my School companions, your pupils with me in days of happy memory, especially Papillon and Bottex, (two of the elder Scholars, the latter a nobleman, the former of humble birth but of fine talents, and now himself a worthy teacher) and myself, often think and talk together of you; often recal those sacred lessons of morality you taught us; and in truth, if I now assure you that those very lessons form the actual principles on which I endeavour to regulate my life, I do so only as it affords me, at the same time, an opportunity of expressing to you a small measure of that feeling of gratitude which I so justly owe you.

I have only just come in from the Country, the very evening before the departure of the Vessel that is to carry this letter, and therefore write it in haste. I trust, however, it will be as kindly received as if it were deliberately traced copper-plate. Excuse, then, my scrawling hand; it will at least convey my sense of what I owe you. Know, Reverend Sir, that I have you in my heart, and that I offer up my ceaseless prayers to the Almighty for your preservation. May you ever, as the wise desire, be the sower of good seed. I am now employed by General Dupuy; if you address your letters to his Bureau, they will duly reach me. I beg you to write very often; I will willingly pay the postage, so interesting are your letters to me, so much do they delight me. My relatives and friends participate with me in these feelings. I beg my respectful remembrance to your esteemed Lady; entreat her to accept the assurances of my boundless gratitude: I am hardly less indebted to her than to yourself.

Papillon is now the head-master of the Primary School, and receives 70 Dollars (about £17, 10) per month; thus you see, Reverend Sir, how your pupils are distinguished. Every where it is said "this is one of Mr. M.'s pupils"; and then what praises are lavished on them! so you see yourself what benefits you have conferred upon us.

But it is past 10 P. M., Rev. Sir, and I must hasten to carry my letter to the Consignee (of the vessel.) I have omitted to touch upon many things; you may judge how I am limited as to time. Will your Lady now receive the assurance of my strong affection and regard; as also your children? Write me, I pray, very often.

I am, with profound respect, Rev. Sir,
Your most devoted servant,
JAMES EMANUEL.

To this there is a P. S. in English—"My mother is dead, since November last the 30th. See what we become in this life!"

A late Report (I forget the year) of the British and Foreign School Society, bears witness, that amidst all the revolutionary changes that have since happened, and after the overturning of all

that Christophe had so long laboured to effect, vestiges of no small value yet remain'; and especially notices that all that is now done in education is done by teachers who were once my pupils, and previously those of Mr. Gulliver at the lower school, from 1816 to 1820. Amidst great discouragement and in want of almost every school requisite, even to slates and pencils, not to say books, &c., some of these excellent men are yet zealously labouring to extend to others the blessings of education which they themselves received in Christophe's establishments, and which they then so highly prized. May we not well hope that a blessed and still more extended harvest will yet be reaped from the same good seed which has produced so happily and so largely in them? Who can estimate the result of the reception, by a single mind, of the principles of truth and virtue? an individual may become the regenerator of a district, a nation, a continent; the benefactor of distant generations.

Strengthened by the recollections and assurances of a mercantile friend now in this City, but who then carried on commercial transactions with Hayti, visiting it repeatedly himself during a period of above six years, I can assert that Christophe highly favoured both home cultivation and foreign commerce; and though his was a strictly Military Government, exerting itself, too, in a revolutionary condition of Society, and among a people but just emancipated from a grinding slavery, he was yet ever most faithful to his personal engagements. If some of his regulations may have ill accorded with *our* notions of the strictly equal or just, it ought to be considered that the fortune of war, as it is termed, or rather the course of providential events, had made the successful chiefs absolute masters of the whole soil of the country; that scarcely an individual (the European planters slain or exiled) then existed, who claimed a just title to a foot of land, to a house or any sort of real property whatever; that the fields desolate, the towns and cities burned to the ground, commerce extinct, and manufactures unknown, the sinews of Government could only be drawn from proprietary rights or regal imposts; and that, consequently, the fourth of the produce was after all but an easy purchase of the lands of their former masters by the present possessors; while the further customs and other dues, though heavy in the abstract, were a moderate enough contribution to the necessities of the common-wealth from those who from hopeless slaves had become at once Landlords and men of consequence, in full possession of the fields which once they laboured for others. As to the liberal treatment which foreigners of known probity received from Christophe, a simple fact shall suffice: it is in perfect keeping with all that I witnessed whilst at Cape Henry. The gentleman above referred to, had brought out an investment of miscellaneous goods, some of which went off heavily; there was only a solitary (Government) Gazette in which announcements could be made, and its circulation was of course limited; hand-bills were not in use. There was only the Government Press, too, at which any thing could be printed, and that but by special favour. My friend solicited and obtained leave to strike off a few Bills, and no other plan being available, saw them himself duly posted, one evening, on the walls at the corners of the streets, but without taking the precaution to ask licence for so novel a procedure, apprehending no ill result. It so happened that, next morning, Christophe rode into Cape Henry

attended by his Aides-de-camp. His eager eye immediately caught my friend's hand-bills. "What?—how?—when?" cried his Majesty, in rising wrath, apprehending on the instant some revolutionary movement or a seditious announcement,—"Who has dared to do this? Run," to an Aide-de camp, "and see what it is." The functionary returned with the intelligence that it was only Monsieur N.'s harmless advertizement of some foreign goods for sale! "Ah! Ah!" said the pacified monarch, is that it? well, well; we must not let Monsieur N. lose his market, nor his investment prove a ruinous speculation." N. B. This Gentleman was advantageously known to Christophe in previous dealings with Government; and it speaks well both for him and the man of power, that what in another case might have been little satisfactory, if not disastrous in the result, had a very different termination indeed. That very day the Baron Dupuy came up to my friend's store, and asked to see the goods. He went from article to article, ticketing as he passed, at the prices named; and after a good round sum was totaled for articles the least likely to find a vent in the place, giving an order on himself for the amount, concluded by saying—"There—you will find no difficulty in disposing of what you have now left; I suppose you can judge for whom these are purchased?"—and so departed. So it proved indeed; for my friend, by this very contingent circumstance, reaped a handsome profit on his commodities. The fact is proof, I think, that Christophe could not only appretiate probity and promptitude in mercantile character, but could exemplify in his own conduct a generosity and liberality of spirit of a high order.

As to religion Christophe was, I suppose, a *practical* skeptic. For, alas! he knew it only as distorted and disguised beneath the aspect of Roman Catholicism, and under the old French colonial Regime; when devotion and debauchery were in close union among all ranks; when ignorance the most deplorable gave currency to superstitions the most ludicrous and insane. Add to this all the license of a West Indian colony, the horrors of revolution, those convulsions of society that brought down the proud and elevated the slave, and one can find little difficulty in deciding what must have been the religious (or rather irreligious) condition of Hayti at the period in question. On the one hand, Protestant Christianity was unknown; on the other, Romanism had become a mere scintillation of light amidst dense clouds of darkness and superstition. Christophe, with the readiness of the sagacious politician, apprehended, and with the promptitude of the experienced soldier, resolved to crush at once the influence of a foreign and most wily, jesuitical and unscrupulous priesthood; one which must ever, he knew, be in the interests of France and of the Papal power. The Priests, therefore, were expelled; one individual alone remained, who was ludicrously enough decorated with the title of "the most eminent and most reverend the Archbishop of Hayti, grand Almoner of the King, &c. &c." This functionary was retained because required for the solemnization of marriages among the Nobility, &c.

"Why," indignantly asks the Baron DeVastey, in one of his masterly volumes, entitled—"Reflexions sur les noirs et les blancs &c.," and printed at Cape Henry in 1816—"Why, since under the frightful Regime of the Colonists, we had Catholic Priests, Roman and Apostolic, in every Parish of the Colony, why were we (the Blacks) as

ignorant as the people of Congo or of Abyssinia? "Why were we so little moralized, whilst professedly Christian? "Why?—because the Priests were only so many instruments, employed and paid by the ex-colonists, for retaining us in a state of abject depression, and so preventing us from shaking off the yoke of slavery! Those priests incessantly insisted to us in their sermons, that the *Whites* were of an essentially superior nature to ourselves; they preached to us submission, respectful behaviour, humanity towards the Whites: and to console us under the tortures and chastisements we underwent, they told us we must patiently suffer pain in this world, in order to become happy in another! In this way they moulded us into a base contentment with our slavish condition, and habituated us to the endurance of its burdens. The ex-colonists gave not the lie to the truth of these assertions. *They* knew full well the empire over us possessed by the priests, an empire so favourable to their interests: and therefore, in all the writings they put forth, their never failing expedient for bringing us again into bondage was to send *priests* among us; in order, under the respectable covering of religious zeal, to have the opportunity of hurling us back into the abyss from which we had been raised. Let them know, however, that we broke the children's rattles of superstition when we shook off the chains of slavery!" Again—"In every country where the priests met with obstacles to the establishment of their authority, they became intolerant. Abandoning altogether the true Gospel morality of our divine Saviour, these hypocrites have ever employed themselves in stirring up strifes in families and exciting civil wars in kingdoms. To possess themselves of power some whole peoples have been exterminated; others, more happy, wearied out at last with the persecution and tyranny of these fanatical gladiators, have expelled them from their soil. Thus, ye ex-colonists, thus it was that America, Congo, Abyssinia, China, Japan, profited by the light of Christianity! All the great moral evils that afflict and desolate the human race are but the work of fellow-men; who not content with having produced these countless calamities, dare even to proceed a step further, and to calumniate the Author of nature himself as the cause of them!!!" Much to the same purport follows, put together with equal force of truth and strength of eloquence.

Hence it was that Christophe made Priests contraband: whilst Protestant Missionaries, if only recommended by well-known and proved friends of Africa, Wilberforce, Macauley, Stephen, &c., might have established themselves in perfect security, and been sure of a kindly welcome. I was acknowledged as Chaplain as well as Professor in the College, and the functionaries of Government frequently attended our service, which they called "assister à la Bible." During my whole stay I conducted Divine Service according to the forms of the Anglican church, not only in English for the foreigners resident in the Capital, but also in French for the pupils of the College and all who chose to attend. I had printed also, at the Government Press, free of all expense to myself, an edition of the Prayer Book, revised, altered, and curtailed, suitably to the country, people and circumstances; this was used daily in the College. A large quantity of French Testaments were sent out by Mr. Wilberforce for distribution, and were circulated without let or hindrance. I remember, on the contrary, that a countryman of my own, an Abbé O'Flynn, of all the names in the

Irish calendar, with letters from his Holiness the Pope, landed unexpectedly at Cape Henry, whilst I was there ; but before I could call upon him he was under way again from the Island, being ordered off the same day by the Government ! If this was not religious predilection, it was at least sound political discernment.

I said that the Archvêque d' Hayti was retained for the purpose of performing the ceremonial of marriage. The Court of Henry of Hayti was, in outward propriety, as seemly as any Court in Europe. No female of dubious fame was ever allowed within its precincts. Every nobleman and person in office, Civil, Military or Naval, the Judges, &c., all were regularly united in matrimony to their acknowledged spouses, and the Sovereign, in performing his "progresses" from time to time through the country, being always accompanied by the Archbishop, every where assembled the troops and rural population, and saw performed the rites of marriage between the candidates for connubial felicity, at times, perhaps, oddly or somewhat arbitrarily paired; yet, if not always well *assorted*, at least *consorted* with all due solemnity. This shewed little of the *savage*, if somewhat of the Autocrat ; and if savouring more of the regime of Military power than of free will and moral suasion, yet indicated a clear perception of the necessity of domestic morality. Concubinage and indiscriminate connexion of the sexes had been the badge and worst fruit of slavery, and was amongst the greatest curses that ever accompanied it. Wholly to wash off the stain will demand a generation or two, it may be : but assuredly the commencement of the regeneration of his people was, in this and other important aspects, well begun by Christophe and his contemporaries in power.

In his own domestic relations, Christophe was peculiarly happy. His wife was everyway worthy of him, and in some respects his superior. In regard to religion, as far as acquainted with its nature and power, she justly merited to be esteemed pious, devout and exemplary. Her influence over her husband was considerable, and was always exerted to soften his severity or mitigate his anger. She was benevolent to a proverb, humane, humble and unpretending. She protected the last vestiges of the *religieuses* of the old Colonists, and was ever known as the friend of the poor, the defenceless and the distrest. She was truly a good woman, and her loss to the country was an irreparable one. She was much darker than Christophe, and was at that time (in 1818,) about forty years of age.

Her daughters, for whom two ladies from America had been engaged as instructresses, were amiable young women, but of no strongly marked character. Not a whisper, however, was ever breathed of anything in them either unlovely or discreditable. Her only son was the Prince Royal, a youth of mild and gentle disposition, most inoffensive and well spoken of; another Prince, Victor, had been adopted by Christophe, and gave large promise of ability and good conduct.

In imitation, probably, of the Prussian Frederic, Christophe's place of abode, about 16 miles from the Cape, was named Sans-Souci ; there, too, the great body of the nobility and military aristocracy had houses. The king usually visited the City twice in each week, to hold levees, receive presentations, give audience to strangers, review the garrison, &c. He had generally something gracious or pleasant or compliment-

any to say to every one introduced ; his bearing was always sufficiently dignified, without ordinarily the slightest symptom of hauteur.

His favourites, of course, he had among his courtiers and public servants ; but I think he had always reason for any marked expression either of good will or distrust. The Mulattoes feared him ; speaking of them as a body, he was held to be their enemy and more to favour the Blacks. Political and domestic reasons could be given, perhaps, for the impression ; and reasons not less conclusive offered in justification, or at least in palliation, of occasional severities exercised towards them. When, however, it is considered that far the greater number of his ministers and others in places of trust and influence, were Mulattoes, who certainly served him with spirit and shewed zeal and fidelity, nay of strong personal attachment, there does not seem, I think, sufficient ground for the often repeated assertion that he was unfriendly to the class. Indeed he was a Mulatto himself, though having certainly far more of the African than of the European in his physical composition.

On the whole, Christophe was a very remarkable man and a great benefactor to his people. The following address was presented to him on the anniversary of Haytian independance, which was annually celebrated with great parade and ceremonial : Banners waved, Artillery thundered, and drums beat ; the houses were illuminated, business was laid aside : The troops assembled, the whole nobility congregated, and every individual functionary and officer of the Army and Navy, together with the whole of the private soldiers, the Judges, and in short the whole population renewed a solemn oath of fealty to the Sovereign and obedience to the laws ; abjured slavery and a foreign yoke, and vowed vengeance to the death on those who should seek their subjugation, &c.

This document, which having been first presented in English was returned for the presenter's own French translation of it, was most graciously received ; and to it was given the acknowlegement subjoined, signed by the King's private Secretary, but conceived in the *first* person and, what is most unusual, in the singular number. It presents in a small compass the writer's veritable opinion of the character of Christophe's administration generally, and of the benefits which, in his judgment, it conferred upon the country ; on that account, chiefly, as forming a kind of summary recapitulation of all that has been stated, it is here annexed !

TO HIS MOST EXCELLENT MAJESTY.

The respectful and humble address of congratulation on the 16th Anniversary of independance, of the Reverend William Morton, Professor of languages in the Royal College of Hayti.

May it please your Majesty !

The commencement of a new year has brought round another anniversary of the independance of Hayti, a country over which your Majesty has been called to reign as over a people in whose cause your sword had been unsheathed, for whose liberties your blood had been shed : in the assertor of their claims to the inalienable rights of humanity, the people have recognized their King.

The sword has been replaced within its scabbard ; but your Majesty's zeal has found another channel for its exertion, and the bravery of the warrior has been succeeded by the wisdom of the Legislator. Not only will the page of History tell to future ages that Henry the 1st, gave liberty to the Haytians, but that from him

also they received their laws, the guarantee of its preservation to their posterity. Your Majesty's renown will be even greater than that of the intrepid Patriot whose bosom beat high with a generous ardour for the emancipation of his country from an ignominious yoke, and on the point of whose sword liberty had staked her triumphs; it will also be that of the legislative sage, whose powerful reason placed a barrier between the ennobling passion for freedom and the intoxication of licentiousness.

In ages yet remote the people of this country will feel their bosoms swell at the name of Henry; and will hail him as their deliverer from a disgraceful thraldom, and the founder of their commonwealth. They will say—"He shewed the white men that we were brave, when he led our forefathers to victory and to triumph: he taught our proud calumniators that as our arms were powerful, so our intellect was fully equal to their own; he filled our Ports with the ships of the Stranger, and gave us to participate in the commerce of the world; he instituted the Schools in which our youth were instructed; he brought the Bible in our native tongue from the shores of the Briton, and put within our hands the inspired volume from which we receive the sublime doctrines of religion, and are taught to practise the holy precepts of morality; he restrained the unhallowed intercourse of the sexes, the badge and mark of Slavery and degradation; and in uniting our fathers and our mothers by the sacred rites of marriage, opened the channels of the social affections and rendered our homes the abodes of reciprocal benevolence and solid enjoyment; our nobles trace their descent from those illustrious youths who received, in colleges of his establishment, knowledge and wisdom and virtue; in fine he led us to peace, to plenty, and to happiness, by teaching us to fulfil our duties to our Maker, and to yield a willing obedience to salutary laws." Such, Sire, will be the retrospections of the people of Hayti, long after your Majesty shall have been gathered to your fathers; for the glory of the brave and the good can never die. Should your beatified Spirit be permitted to become acquainted with the transactions of those who shall then inhabit the country over which your Majesty now reigns with so much lustre, how will it exult in the effects of your exertions!

Permit me, Sire, to present a respectful tribute of admiration of your virtues, and an expression of that sincere devotedness with which I labour in your Majesty's service, a service which has for its object the true and highest happiness of your people. Nursed in a land of freedom and exulting in the name of Briton, I feel myself on this great day filled with reverence for those brave Patriots who drove their tyrannical enslavers from the soil of Liberty; I repeat to myself the names of those valiant men and noble officers, who have died in the field of battle, and of those who to-day, after hard earned triumphs, exult in renewing the remembrance of their glorious deeds in your Majesty's presence; of whom to distinguish any were invidious. I content myself with presenting my petitions to the God of Battles, who has given the victory to the side of justice, and triumph to the cause of outraged humanity; who has asserted in the success of your arms, the eternal truth of that divine declaration that "He made of one blood all nations of men to dwell on all the face of the earth"—I bow before the mighty God, and supplicate that he would be the Guardian of Hayti; that it may be ever free as it is at this day; that he would add many years to your Majesty's life, and to the lives of the faithful sharers in your victories; that your august Consort and your Royal offspring may long continue to contribute to your Majesty's personal enjoyment and to the happiness of the country; and that full of days, of glory and of virtue, your Majesty may descend in calm unruffled peace into the tomb, only to reascend to the enjoyment of an everlasting crown; and may the diadem which your Majesty now wears, long adorn the brows of your descendants!

When I return to the land of my birth, I shall bear with me the recollection of having exerted myself, in however insignificant a measure, to the accomplishment of one of your Majesty's most important and admirable designs for the happiness of your people, the education of the rising generation; and while permitted to live, shall rejoice in having contributed my humble labours in so glorious an undertaking. I humbly beg your Majesty to accept my respectful offering of congratulation on the return of this day, and your gracious permission to assure your Majesty of the sentiments of profound respect and veneration with which I am, and shall continue to be, your Majesty's most devoted,

Most obedient, and most humble servant,

W. MORTON,

&c. &c.

Literal Translation of the King's Reply.

(ARMS OF HAYTI WITH THE MOTTO)—

"*Dieu, ma cause, et mon épée.*"

God, my cause, and my sword.

Palace of Sans-Souci, the 12th January, 1819; *the 16th year of Independance.*

THE KING.

To the very Reverend William Morton, Professor of Languages in the national College at Cape Henry.

SIR,

I am much obliged by all those good wishes which you have expressed for me at the opening of this year, and accept with pleasure the assurance of those kindly sentiments which your letter conveys. Depend upon my esteem and protection, and believe that I wish you, Sir, a happiness equal to your merit.

By order of his Majesty,

(*Signed.*) CHEVALIER DE PREZEAUX.

Of the last closing scenes of Christophe's life and Government I was not witness, and shall therefore pass them over. Those who take an interest in his fate will have recourse to authentic history. I will only shortly state, that among the conspirators was a kinsman of his wife's, General Paul Romain, then Prince du Limbé, a Mulatto, in whom he had reposed confidence, and who certainly had no cause, beyond the stimulant of rivalrous ambition and vague hope of, possibly, still higher advancement, for acting the part of a traitor.

My heart sickens when I think of the results of the revolution of 1819. Men, whom I once knew familiarly, dragged by their feet about the streets, and massacred in cold blood, or miserably slain in civil contest—The talented DeVastey's brains strewed upon the pavement; the unoffending Princes, without fault of their own or crime of any kind, simply because the sons of the deposed Sovereign, shot in the open square of the city in front of their father's Palace—Christophe himself—who, when certain accounts of the extent and success of the insurrection reached him, seeing at a glance the hopelessness of opposition and knowing not in whom to trust, without troops or generals, had applied his own pistol to his breast—indebted to the charity of an attached servant for a secret grave, into which quick-lime was hastily poured in order to hasten decomposition and prevent indignity to his lifeless corpse—the good and benevolent Queen, who had not an enemy it is believed, yet to whom circumstances made *all* enemies, compelled to escape on board a friendly vessel, and with her hapless daughters, the bodies of her husband and her son unwept over and unembraced, to seek on foreign shores a shelter and security—these are events that make one shudder, fearfully exemplify the evils of war, and render the ambition and covetousness and selfishness that sustain it, loathsome and abhorrent indeed.

I shall perhaps be excused for subjoining the lament of *one* sincere mourner when Christophe fell; one who was with me in Hayti and had learned to respect and love the many amiable and admirable qualities of the man and the Sovereign, the patriot-soldier, legislator and father

of his people. She, too, sleeps in her lowly bed; but her verse yet sounds with a doubly grateful, though melancholy, interest and sweetness in my ears, sweeping over the chords of memory and reviving recollection of very mingled character, realizing "the joy of grief!" With them I shall close these details, which have extended far beyond my original intention, and so as perhaps to try the patience of the reader. He is intreated, however, to pardon their prolixity, in consideration of the interest to the narrator himself of these recollections of one whom, with all his faults, he cannot but number among THE BENEFACTORS OF HIS RACE.

Liverpool, 1820.

DEAR W——

The late melancholy event has awakened the feeble spark long dormant: if you can excuse *poetic enthusiasm*, perhaps you will like these unconnected ideas thrown together in the midst of noise and bustle—— C. O. M.

A TRIBUTE TO THE MEMORY OF

HENRY THE FIRST, KING OF HAYTI.

While others seek the meed of public praise,
And crown their heroes with the laurel wreath;
And round their urns a blaze of glory raise,
And strains poetic to their mem'ry breathe—

My weeping Muse more humbly would bewail
One whose bold ardour taught him to aspire;
And proudly spurning Slav'ry's hateful chain,
Fan the bright flames of patriotic fire.

One who, regardless of the dangerous foe,
Rush'd with impetuous valour to the field;
And rous'd and fir'd by a nation's wrongs,
Compell'd the blood-stain'd Hosts of treach'rous France to yield.

Who burst the bonds of Ignorance and Vice;
Rewarded merit with a liberal hand;
And bade the glowing hopes of Hayti rise,
Prepar'd for glory, worthy of command.

Who snatch'd the helpless female from contempt—
Her rescue gain'd from infamy and shame;
No more the victim of seductions base,
Thro' *him* she boasts a wife's and matron's name.

Lamented Prince! His glory's sun is set;
He lies unhonour'd in his lowly bed;
Base Factions dire have laid the Hero there,
And Treason tramples o'er his royal head.

And oh! what heart that feels a generous glow,
Can view, unmov'd, the ruin of his race?
His blameless Consort's agonizing woe—
His royal offspring's murder or disgrace?

O fell ingratitude! thou fiend accurst!
What! could not countless benefits avail?
Among his *friends* he call'd Romain the first;
And could Romain his sacred life assail?

Wealth, Titles, Honours, lavishly bestow'd,
Restrain'd they not his sacrilegious hand ?
No—heedless of the source from whence they flow'd,
He, too, plans treason with the hostile band !

Base ingrate ! we shall see thy triumphs end ;
Shall see thee rous'd from thy ambitious dream,
To feel Remorse thy impious bosom rend,
And need the mercy then denied to him !

But *could* a horde of miscreants be found,
So lost to ev'ry sentiment of shame,
To dash his regal honors to the ground,
And level with the dust their Country's fame ?

Insatiate wretches ! sheathe your murderous swords ;
Respect the body of your bleeding sire ;
Nor dare to injure that majestic form,
Whose frown has ceas'd your terror to inspire.

Henceforth let no man seek in man a friend !
Since Haytians from fidelity depart ;
Let no man say, and on your oath depend,
'The sable breast enshrines a grateful heart.'

Oh ! Race degraded, destitute of truth !
To chains and slav'ry worthy to return !
Soon will you need the guardian of your youth,
And they, debas'd, his loss for ever mourn !

Betray'd, forsaken, urg'd by stern despair,
With pure Religion's holy truth unblest,
He could not look for strength and comfort there—
But, erring, plung'd the weapon in his breast !

His lofty soul, with gen'rous pride disdain'd
Submission mean or parley with the foe—
Oh ! had he been by Jesu's faith sustain'd,
We had not mourn'd he bade his life-blood flow !

O noble Henry ! brief was thy career,
But fill'd with deeds of glory and of fame ;
And though unhonour'd thy untimely bier,
Revolving ages shall record thy name.

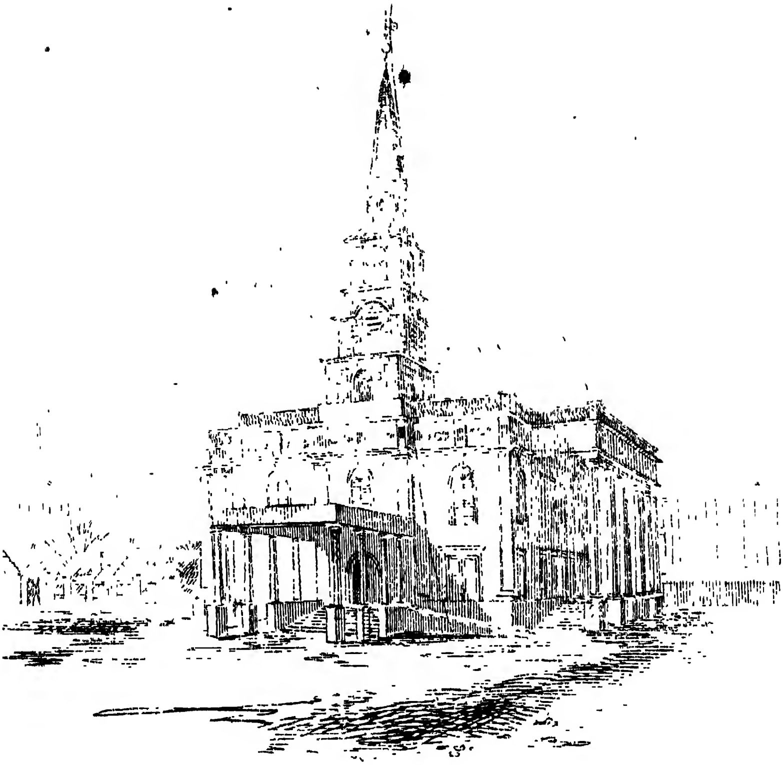
What though no stately monument adorn
The *mourne** where Henry's cold remains are laid—
The *generous* soul his virtues will record,
And cast his errors in oblivious shade.

Oh ! may those errors be with mercy view'd,
When at the dread Tribunal he appears ;
And the avenger of a nation's blood,
Blot the dark record with a nations tears !

The above is the feeble expression of a heartfelt sorrow for the late illustrious chief, whose melancholy fate will often excite indignation in the feeling breast—

HENRY THE 1ST, KING OF HAYTI.

*** Mourne, a woody hill ; in one of those in the neighbourhood of Sans-Souci the remains of Christophe await the Resurrection !**



ANNALS OF ST. JOHN'S CATHEDRAL.

The religious condition of the early British settlements in India, seems to have afforded but feeble proof of the prevalence of true Christian principles. We look in vain, amongst the records of that eventful period, for any traces of the deep religious feeling which animated the 'Pilgrim Fathers' when they left their native land in search of a quiet home and 'freedom to worship God.' Their countrymen, who in the same century established themselves for a very different purpose on these eastern shores, appear, with but few exceptions, to have disregarded even the outward forms of religion. We readily admit that much external profession is no sure evidence of true piety ; yet is it equally certain that the absence of all such profession manifests a deplorable state of religious feeling. The venerable Dean Prideaux, in his letter to Archbishop Tenison, 1695, respecting the English settlements in the East Indies, and the best means for the propagation of Christianity, remarks, "there is not so much as a chapel in any of the English settlements for the true religion, except in Fort St. George only—in other places the room they eat in contains their congregation."

Our lot is cast in far different times. The cent[illegible] and a half that

has intervened, has witnessed not only the extension of our empire beyond the bounds of antecedent probability, but with it an awakening, and still increasing desire, to convey the blessings of the Gospel to those around us, and in some measure it is hoped to exhibit its purifying influence in our lives. We have only to look round us in this city to see, on every side, tokens of the growing importance which is attached to the externals of religion. The "Fire and the Wood" are amply provided; we have no lack of the means of grace; there is a general recognition too of the propriety of those observances by which Christians in a heathen land should be discerned as a 'peculiar people;' and if only "the lamb for a burnt offering" be vouchsafed,—in other words, if these outward aids are made instrumental to the faithful exhibition of "the lamb of God," as He who alone can 'take away the sin of the world,' the annals of these 'temples made with hands' will have a far more enduring memorial than any that we can give; for they will be lasting as those immortal souls that shall be quickened to spiritual life within their hallowed precincts.

The handsome edifice, of which the sketch is before our readers, was commenced in 1784 and finished in 1787. It has been already stated in a former number of our Review, that the first church erected in Calcutta (also called St John's) stood at the western extremity of what is now known as Writers' Buildings. It was destroyed at the capture of Calcutta by Suraj ad Dowlah in 1756, after it had been in use for about 40 years. When our affairs began to assume a more settled aspect, a small chapel was built, it is presumed at the expense of the Company, within the walls of the old Fort, probably about the year 1762, six years after the battle of Plassey. It was of mats or straw, and seems to have been intended merely as a temporary refuge until arrangements should be made for the erection of a more appropriate structure. This desirable consummation, however, was long delayed, whether in consequence of the supineness of the inhabitants, the want of encouragement on the part of those in authority, or the great mortality amongst the Chaplains at that period, it is now impossible to ascertain. Very probably all these causes might combine to delay the good work. In ten years, from 1758 to 1768, six Chaplains appear to have died in Calcutta; and as the settlement at that time was only allowed, it is believed, one Chaplain, their removal by death, in such rapid succession, must have been a great hindrance to all those undertakings in which they might naturally be expected to take a special interest. In consequence of these various obstacles, the design of building a Church languished for several years. The inhabitants remained contented with their straw Chapel in the Fort; to which, as we are informed by contemporary annalists, the Governor used to walk every Sunday when the weather permitted.

The erection of the Mission Church in 1771, by the noble devotedness of its revered founder, may have stirred up the dormant zeal of the settlement; but still the work was postponed. Thus in the most important concerns of life ———

> "Our great resolves pass by
> Like winds whose loftiest Pœan ends but in a sigh."

At length, however, there *was* a stir amongst the dry bones. Towards the close of 1783 proposals were circulated throughout the settlement for erecting a Church by public contribution. These were cordially

responded to, and on the evening of the 18th of December, a meeting of subscribers was held in the chapel at the old Fort, in conformity to public notice. The Hon'ble Warren Hastings presided, and the names of 24 of the most influential persons in the settlement are recorded as being present. A Committee of 17 was chosen, of whom Warren Hastings was one. Edward Hay, Esq. was appointed Secretary. The list of contributors read at the first meeting contained 54 names, and their subscriptions amounted to nearly 36,000 rupees. Warren Hastings gave 2000, Mr. Charles Weston 5000, and the rest 1000 and 500 each. At one of the early meetings of the Committee, the Governor General having been prevented from giving his personal attendance, requested the Rev. Mr. Johnson, the Senior Chaplain, to inform the Committee that he had received from Maharajah Nob Kissen a formal gift of the ground commonly known by the name of the Old Magazine Yard, for the use of a Church; the ground was valued at 30,000 rupees.

The letter which states this, is addressed by the Committee "to the "Hon'ble Warren Hastings, Esq. and the Members of the Board of "Revenue." After regretting that the inhabitants of the settlement had never, until lately, taken steps to erect a place for the celebration of divine worship, they go on to observe—"it must have occurred to your "honorable Board that such a building became more and more neces-"sary every day, the number of inhabitants being very considerably "augmented, and now so large that we can venture to pronounce "that the present straw building which is in use for a church, is not "adequate to a tenth part of the number. This has also been observ-"ed with much concern by your established Clergy, and particularly "by the Rev. Mr. Johnson, at whose recommendation (and we mention "it to his honour) proposals have been circulated for erecting a church "by public contribution. We are happy to acquaint your honorable "Board that the proposals have hitherto met with a success beyond our "expectation, the sum of near 60,000 rupees being already subscribed "to them. We ought also in justice to observe to you, that Maha-"rajah Nob-Kissen, one of the Hindoo inhabitants of this settlement, "has been so generous as to appropriate, through the Governor General, "a large spot of ground, well situated in this city, and valued at more "than 30,000 rupees, to the use of the subscribers for the erection of "the intended church." The letter concludes by begging the interces-sion of the Board with the Court of Directors for their support towards the undertaking. The Court, in answer to this appeal, gave £ 1,200. to assist in providing an organ, Communion Plate, bells, clock, &c. Printed copies of proposals for subscriptions to the church were for-warded to every chief resident and commanding officer at the Civil and Military Stations within and without the Provinces, calling upon them to assist by every means in their power to collect subscriptions. In addition to the land obtained from Nob-Kissen, the Committee were allowed to clear the old burial ground, which had long been out of use, only leaving those tombs of which the inscriptions were legible, and the sepulchre of the Charnock family. These two pieces of ground form the present compound of the Cathedral—all traces of the original division are of course long since obliterated.

The old Magazine having been pulled down, an[illegible] round properly

cleared, the foundation of the Church was laid on the 6th of April, 1784. A copper plate fixed into the stone bears the following inscription :—

THE FIRST STONE OF THIS SACRED BUILDING,
RAISED BY THE LIBERAL AND VOLUNTARY
SUBSCRIPTION OF BRITISH SUBJECTS
AND OTHERS,
WAS LAID UNDER THE AUSPICES OF
THE HONOURABLE WARREN HASTINGS, ESQ.
GOVERNOR GENERAL OF INDIA,
ON THE 6th DAY OF APRIL, 1784,
AND IN THE 13th YEAR OF HIS GOVERNMENT.

It may be mentioned as an instance of the comparatively high remuneration awarded to European skill sixty years ago, that the English engraver charged 232 Rupees for his work.

Amongst those who exerted themselves in forwarding the designs of the Committee, Mr. Charles Grant, who then resided at Malda and who had interposed in the hour of danger to preserve the Mission Church from desecration, as stated in a former paper, is particularly mentioned. Through his efforts a number of large stones, some of them beautifully ornamented with sculpture, were forwarded from the ruins of Gour, in the belief that they would be suitable for the pavement of the church. It does not appear in what way these ancient relics were used, as no traces of them are discernible in the present building. Other persons gave their voluntary offerings in aid of the design.—The beautiful picture of the last Supper, so striking as a work of art, was painted by Zoffany, and by him presented to the Church. The Committee wished to acknowledge this valuable gift by presenting the artist with a ring worth 5000 Rupees, but owing to the want of funds they were obliged to forego their intention. Lieut. Agg, of the engineers, had the entire construction of the building ; it was completed from a design furnished by himself. There is some difficulty in ascertaining the exact cost of the church ; upwards of a lac and a half of rupees appear to have been expended upon it up to April, 1787, exclusive of the remuneration to the architect which was Sa. Rs. 22,793, being 15 per cent on the amount expended. Nearly the whole of this sum [with the exception of the grant from the Court of Directors already mentioned, of £1200, and 14000 Rs. granted by the Government], was raised by voluntary contributions. The Church was consecrated on the 24th of June, 1787, by a special act of consecration sent out by the Primate, the Governor General, Earl Cornwallis, being present. In 1811, during the administration of Lord Minto, the Church was much improved and enlarged at the expense of government. Since that period slight alterations have been made at different times, but generally speaking the internal arrangements which were then adopted still exist. It will seat comfortably about 600 persons. In 1814, in consequence of the erection of Calcutta into an episcopal see, this church was designated St. John's Cathedral. The first Bishop, as our readers are aware, was the excellent and learned Dr. Thomas Fanshaw Middleton. He was formally inducted into possession of the see by Dr. Ward, the Senior Chaplain, on the 2nd of Dec., 1814, and Mr. Loring into the Archdeaconry on the 24th of Dec. The Bishop closed his valuable life on the 8th of July, 1822. He possessed powers of mind of the [illegible]hest order. His manner had an appearance to strangers of ste[illegible] and hauteur ; yet he is said, by those who knew

him intimately, to have been full of the 'milk of human kindness,' with a consideration for the feelings of others as sincere, as it was generally speaking unexpected. The commencement, and, indeed, the whole period of his Episcopate, from the undefined, unsettled, posture of ecclesiastical affairs, was one of considerable difficulty, requiring him frequently to assume a position which led those opposed to him to imagine that *combativeness* strongly preponderated in his temperament. It was, however, an imperative sense of duty which animated him at all times ; he was in truth one of the most conscientious of men, and if at times he appeared unyielding, it was not from any desire to oppose, but from a persuasion that a contrary and more popular line of conduct would but betray the important interest he had so deeply at heart. It is probable that the Bishop was aware of a certain distance or coldness of manner which might operate to his prejudice in the minds of others, for amongst some brief private memoranda written on board ship on his voyage out, there is one enjoining on himself attention in this particular, since "manner is something with every body, and every thing with some." The Bishop was remarkable for his critical skill in the Greek language ; his famous work on the Greek article and its important influence on the right understanding of many passages in the Greek Testament is well known to scholars and divines.

Bishops Heber, James, and Turner each succeeded to the see, in a comparatively brief period, the last mentioned prelate having died in July, 1831, exactly nine years after the removal by death of Bishop Middleton. The next selection for the quickly recurring vacancy fell on the present venerable Diocesan. His voice has again and again been heard within the walls of St. John's, enforcing with emphatic earnestness the grand topics of the Christian ministry. He possesses, as most of our readers will admit, a happy skill in the discharge of this important duty of his office—his is not that unimpressive style which has been compared to the smooth flow of oil over marble, but rather one which from its point and energy fixes the lofty theme indelibly on the hearer's memory. May he long be spared to point, by precept and example, the way to heaven! Since the opening of the Cathedral in 1787 seventeen clergymen have been successively appointed as senior and junior chaplains at the Presidency to minister within its walls. These two appointments have been always held, till lately, by the two senior chaplains on the Honorable Company's establishment; this arrangement, however, has been recently altered, the Court only directing that the two seniors on their list, wherever located, shall receive the salaries hitherto attached to the appointments of Senior and Junior presidency chaplain.

The rising fabric of St. Paul's proclaims that the subject of our present notice will soon lose its distinctive appellation as the Cathedral of the see. External privileges doubtless have their importance and value, and far from us be that haughty feeling which would induce us to speak of them with cold disdain ; but our chief anxiety should ever be to be recognized by the searcher of hearts as His spiritual worshippers—to enjoy "the good will of Him who dwelt in the Bush," and that our services of prayer and praise, whenever offered up, may be preparing us for that heavenly temple of which the [illegible] is the Light and God himself the glory.

*** Several of the Tomb stones belonging to the old Burial ground are still to be seen in excellent preservation at the base of Job Charnock's monument. Those that we examined are from 1692 to 1720, the Inscriptions are in raised letters and are as fresh as when first cut. One that attracted our notice is to the memory of Ralph Sheldon—"illustris Sheldoniani stemmatis haud indigna Proles," who died 1709, aged 37. Gilbert Sheldon, who succeeded Juxon as Archbishop of Canterbury in 1663, was remarkable for his devoted attachment to Charles Ist. and for the munificent support which he afforded to the advancement of learning in the University of Oxford. His elder brother was Ralph Sheldon, the representative of the family, which is of ancient descent in Staffordshire.

Job Charnock's monument is dated 1692 : he died in the 10th January of that year. We regarded with peculiar interest the plain slab in the Charnock mausoleum to the memory of Mr. Hamilton, to whose professional talents our nation was so deeply indebted in the beginning of our eventful career in India. It may be new to some of our readers and we therefore subjoin it:—

"Under this stone lies interred the body of W. Hamilton, Surgeon, who departed this life the 10th Sept. 1717. His memory ought to be dear to this nation for the credit he gained the English in curing Ferrukseer, the present king of Hindostan, of a malignant distemper, by which he made his own name famous at the court of that great monarch, and without doubt will perpetuate his memory, as well in Great Britain as in all other nations in Europe."

Amongst the more modern Tombs is one over the remains of Admiral Watson, who died 16th August, 1757, in the full tide of success. The laconic brevity of the Inscription is something in the Veni, vidi, vici, style.

Geriah taken Feb. 13, 1756.
Calcutta freed January 11, 1757.
Chandernagore taken March 23, 1757.
Exegit monumentum ære perennius.

He died 5 months after this last achievement, aged only 44.

Immediately west of the Cathedral are four plain monuments covering the remains of three Judges of the Supreme Court and one Bishop (Turner). The large Cenotaph at the north angle of the Church was erected to the memory of the officers who fell in the Rohilla campaign, but strange to say bears no Inscription whatever, neither is there any reference to the memorial in the Records of the Cathedral.

PRESERVATION OF SHIP'S MAILS.

Loss of the 'Memnon.'

[We feel obliged by the following valuable communication of our friend "Fidus et Audax," valuable, we say, as coming from one whose knowledge and experience so well enable him to comprehend in their fullest degree the dangers to be apprehended and provided against, as well as the likelihood of benefit to be derived from any of the plans recommended. Previous to receiving our friend's letter we had placed in the hands of our draughtsman the sketch of Captain Smith's very simple plan for stowing B[illegible]s for use in sudden emergencies ; a brief notice of the plan will be found in our Selections referring to the sketch in question.]—*Ed.*

To the Editor of the 'India Review.'

Dear Sir,

The severe and distressing loss experienced by the public of India and their correspondents in Europe, by the recent loss of the "Memnon," and the valuable mail she had on board, referred to in the sensible communication in your last number, signed "Our Overland Letters," and in the Editorial remarks appended to it, suggests the necessity of some measures being adopted to prevent in future a recurrence of the latter loss. A[illegible]elope might be made possessing the two chief properties require[illegible]buoyancy to float when thrown overboard, and so air

tight as to be impervious to the wet. Next, a handy part of the main deck for a temporary enclosure might be appropriated for the reception of the mail, so that at a minute's notice it might be removed in any manner as the urgency of the case would demand. While on this topic, seeing how numerous passengers by steam now are, the question very naturally arises,—" in the event of a sudden accident at sea, endangering the total loss of ship, what instant measures are at hand for the protection of the lives on board?"—The boats generally provided for almost *all* ships loaded with passengers are incapable of containing so many souls as must be put into them if the vessel is foundering, or going to pieces ; and where this calamity is sudden, rarely is it possible to get the long-boat out ; and which is always looked upon as the chief resource in cases of shipwreck. Captain Smith, R. N. invented a very useful boat which (in my humble opinion at least) every steamer ought to possess. In lieu of paddle boxes, over the frame work, a boat could be made to fit, and in every way answer the purpose for which paddle boxes are intended, and by means of iron davits, with tackles *always* kept rove, these boats may be got out in an incredibly short space of time.—The first of the kind I ever saw were on board those two splendid steam-ships the " Chilli" and " Peru," when I was on the west coast of South America in 1840, and truly surprised was I on visiting the latter vessel, when her Commander, to prove the utility of these boats to the spectators, got them out in the brief space of *two minutes and five seconds*, and nearly the whole crew scrambled down into the starboard one by means of the davit falls which were kept hooked for this purpose, and much room still remained in her. These two boats alone would have carried easily, and in a heavy sea-way, at least one hundred and twenty adults.—Their peculiar construction, moreover, renders them exceedingly buoyant, and I am certain they would rise on a sea like a duck. Lockers under the head and stern sheets might be made capable of holding the mails, together with a moderate quantity of Biscuit (in water-proof bags) hermetically sealed provisions, and a few breakers of water, *which should always be kept in the boats*, and examined by an officer at least once a week. Some persons may say, " what nonsense ! such a thing as shipwreck very seldom occurs, and what a fuss about what may never be required !" It is this very fancied security that is the loss of more life and property than we are aware of. In the midst of *supposed* safety and comfort, with a dead fair wind, I had an unexpected " notice to quit" by coming in contact with a sunken rock, and in four minutes the ship went down. A steamer is just as liable to such a disaster as a sailing vessel, and I think by the preparation I describe above, the whole of the crew would have found themselves in good sea-worthy boats, with water and food that might last them till they had succeeded in effecting a landing on some hospitable shore, and not as is too often the case, when any are saved by the boats, almost always with certain starvation staring them in the face, and not unfrequently many are drowned from the want of facility in getting out the long boat. I would recommend some abler headed ones taking up this matter, and I think a meeting of our merchants for the purpose of pursuing some measure likely to bring about one or all the foregoing desired ends would ere long prove to the community the benefit they had conferred. Your's faithfully,

Calcutta, 14*th Nov.* 1843. FIDUS ET AUDAX.

THE DAGUERREOTYPE.

To the Editor of the 'India Review.'

SIR,

The concluding paragraph of 'Umbra's' letter on the daguerreotype invites the following explanation of the reason why *every* object is not seen in true perspective in its representation by that instrument.

If a large body be placed near a lens by which an image of it is to be formed, its parts will be at different distances from the lens, and each part, being one of a pair of conjugate foci, will have the other individual of the pair at a distance from the lens depending on its own distance. Hence the distances of the images of the parts of the object will be different and therefore indistinctness will arise. Further, the nearer any part of the body to the lens the greater the distance of its image, and the larger that image, and this is the reason why the hands of a lady are larger in proportion than her face in a daguerreotype portrait.

These causes of disproportionate representation do not affect the images of very distant objects.

A telescope does not shew objects in true perspective.

Your's obediently,

CANTAB.

THE PLENÆRIUM OR WATER BAROMETER.

INVENTED BY CHARLES HUDSON.

To the Editor of the 'India Review.'

SIR,

The general principle of the Toricellian Barometer, is well understood to comprise the counterbalancing of a column of Mercury, against that of atmospheric pressure; and is thus explicable:—that water being supported at a height of 32 feet nearly, giving a weight equal to 13· 9-10ths lbs. on every square inch of base, by estimation; beyond that length of column, it has been found not to be sustained by the atmospheric pressure, or contained in any tube without bursting the same. And Mercury being 13· 56 times specifically heavier than water, it has been found to stand in the Toricellian Tube, at an elevation of 29½ inches, in equilibrio against the same pressure; leaving in the tube a *vacuous* space of 3⅛ inches; which is called the "Toricellian vacuum," and this being the mean result of observations at the Earth's surface, the Mercury falls, when atmospheric pressure is lessened, either by natural causes influencing the weather, or by elevating the apparatus to any considerable height, above such surface, and it rises in the tube when the same pressure is increased either by enhanced density or by descending to a lower position, which must lengthen the column. The sectional densities of lower atmospheres being maintained in geometrical ratio, whilst the heights, are in the arithmetical, increasing ranges are expressed, by equal distances, and (1-10th) one tenth of an inch is found to be the difference or depression at the height of 87 feet, which being the lowermost stratum, if another te[illegible] sought, the range must be greater than twice that measure: whence, hei[illegible]ry considerably with every tenth or digit of depression:

but such being the medium of observations deduced from heights and depths, it forms the basis of the Barometric scale.

It is also a property of the Toricellian Tube, that water or any lighter liquid, such as oil, &c., will not descend in it, unless the length of column be equal to or more than 32 feet: consequently Mercury, by the abstractive powers of specific bulk or gravity, taking the shorter range of 29½ inches, has best suited the practical convenience of the statical observer: the tubes being generally made 34 inches long to the same effect; nor ought they to be any longer than what may be just sufficient for an equilibrium, in order to maintain the uniformity of the computed scale. In these respects, it is undoubtedly a very useful, though an expensive instrument; one difficult of construction, as well as liable to many mischances, when the mercury is impure, or if, in filling the tube, the smallest bubble of air have penetrated and thereby destroyed the perfect vacuum; the specific conditions of the semi-metal being also an important consideration in such cases; but the most common incident, is that which arises from the accidents of position, concussion and rough handling, by which the homogeneous tenuity of the fluid being broken, the instrument is put out of order and then it requires *professional* repairs.

There is another invention known as a weather-glass, which consists of a glass-bottle, about a foot in length and an inch in diameter, containing a solution of Camphor, or of the nitrate of Ammonia in Alcohol, which exhibits a species of chemical efflorescence, whenever the atmosphere is surcharged with humidity. It is likewise a very useful instrument as an indicator of approaching gales and storms at Sea, when it happens to be perfect; for when the ingredients are not duly proportioned, or the strength of the spirituous liquid fails, the substances subsiding into a solid mass, their action is destroyed, and the instrument rendered totally useless. The Sympiesometer, is also a delicate instrument; its chief fault being that of giving alarm too soon or too frequently, when there is no real apprehension of danger—its structure being also complicate.

However, having now expounded the main theory, that of the Toricellian experiment, which may be said to work by depletion or by the indications of a "vacuum;" I shall proceed to recount the principles of a new theory, which I have just devised by a *reverse* process, or which in the place of a vacuum employs a Plenum or artificially condensed air: wherein the properties of its elasticity and expansibility, as well as compressibility, are brought into action and rendered statically available, in supporting *determinate* columns of water, oil or mercury, suited to the ends of equilibration: those which are susceptible, to the delicate impressions of atmospheric changes, commanding, at the same time, a greater facility or accessibility of means in certain cases, than the Toricellian praxis admits of. Indeed the very first experiment I tried, with materials so simple as a bent tin-tube and a glass retort (taken on the occasion from my chemical laboratory, and for which latter an inverted "matrass" has been substituted as more appropriate) cemented to that tube with "lutum sapientia;" so as to leave a transparent shaft of about ten inches; and as these first expedients have fully acquitted themselves of all doubt of efficacy by the most evident proofs of minute susceptibility, I trust the following expositions will not only prove highly acceptable to our Pneumatical Theorists, as offering a substantive improvement in science; but to all who are nautically adventurous or interested, an Instrument, easily obtainable, easily filled as well as taken care of; in short to all who are devoted to science and mensuration: indeed none ought to be without it, any more than without a Clock or Time-keeper. The "plenærium" promises to be of such permanent utility, by being in the least degree liable to accidents or disruption, as well as magnificently efficacious, yet procurable at a small expense; so extraordinary indeed is it as a discovery, that I am not hopeless public cordiality will enable me to defray the expense of procuring a patent for it.—

The figure [*Plate* 32] represents a sketch of this simple Instrument, which I have denominated the "plenærium" and which may be variously constructed, either of metal or glass, and charged with water, oil or mercury, when it may be specifically distinguished as a Hydro-plenærium, an Oleo-plenærium or a Mercurio-plenærium.—The description is generally as follows:—AB.D is a bent tin or metal tube, about $\frac{3}{8}$ths of an inch in diameter (made water-tight,) having an open bowl at A,—and CD is an inverted glass matrass, cemented at D, to the metal tube.—The length AB is three feet, and the glass tubular shaft FD, about 10 inches or something more—the Bulb C is about three inches in diameter.—Water is poured in at A, until it rises a little above D, being then about E in the metal or longer tube: the liquid is then poured in, until it reaches as high as H:—the additional pressure thus conveyed will raise the liquid in the shaft DF; compressing *aërial* fluid, above the liquid surface, and within the Bulb:—the apparatus may now be examined, for the column of water will be in equilibrio, with the power attained by the compressed air, and its susceptibility known by its vacillating quality; for the least perpendicular motion will make the liquid alternately descend and rise, in the transparent tube, from F nearly as low as D:—such extreme ranges of vacillancy denoting the virtual scale of notation or Registry, as well as the equilibrious constituency; which is a fact in nature, for then the most delicate impressions of atmospheric pressure on the exposed surface at H, will be perceptible:—consequently FD is a vertical scale of about 10 inches, which is sufficiently large for acute notations.—The instrument ought to be filled in clear weather, and a small portion of the shaft (above) reserved, for expressing increased pressures if the instrument be designed for measuring the depth of mines. After these adjustments the Instrument will be found to be fitted for expressing atmospheric changes as well as mensuration; for, according to the length of the atmospheric column, the elastic force condensed in the bulb, will be found to operate with relative precision; depressing the liquid from F towards D, when the atmosphere is lightened, or the column less than when the Instrument was adjusted, and raising it, from D towards F, when that column and pressure concurrently are greater; in the one case bringing into activity the elastic or expansive force of compressed air; in the other, exceeding the line of primitive compression.

I have found that the delicate sensibility of the Instrument is likewise equal to the smaller atmospheric changes: such as occur, during a day, between the hours of two in the morning and four in the afternoon; in the present cold season this variation having been found to be about two eighths of an inch:—and in testing its mensurable powers, I have also reason to be satisfied, that the scale when marked off at the surface of the ground, and again at an elevation of 40 feet, has indicated a difference of 1-6th of an inch: which facts, bearing strongly on present demonstrations (the Invention having only a week ago been devised and accomplished), they prove no less, than that when water or other liquid, is once counterpoised, by the compressed density of inclosed air, the entire column of atmospheric pressure, and such compressed medium, act in inverse ratio to each other, divided of course, only by the intervening liquid:—and that then the power of elastic expansion, must act by relative graduations with atmospheric variations after the equilibrium is once effected: the longer branch or column of water expressing determinate quantity, weight and dimensions; which afford certainties or data for computative precision, and hence the Index column (as the transparent shaft may be considered) has a virtual parallelism or miniature expression with the Tangent ranges of the atmospheric; indicating the principle on which the scale should be formed,—namely, that of a semi-tangent graduation, in which the extreme vascillation is the radius of projection, which is the most approximate scale, allowing for the difference of colums of the liquid in the double tube and their gravitous powers under two opposing forces. The equilibrium ought hence to be ensured in the fairest

weather and a clear sky, or at a moment when the atmospheric medium is heaviest.

I trust that the "Plenærium" will be worthy of scientific reception, as a counterpart at least to the Toricellian Barometer, or as an Instrument which may be said to be operative on a directly opposite principle to that which constitutes the basis of the Toricellian experiment—the "Plenum" thus standing in contrast with the "Vacuum."

As the brevity of your space will not fairly admit of my enlarging on the arguments which arise from the discovery now developed, the fact of an Instrument of this description having been in action during the last week, replete with indications of permanent success, will save me, I trust, the pledge of supplying any number that may be required by our professional practitioners; but which I shall be happy to do, at a moderate price nevertheless.

I remain, Sir,
Your very obedient Servant,

CHARLES HUDSON.

Howrah, 12th November, 1843

REVIEW.

The Highlands, the Scottish Martyrs, and other poems, by the Rev. James G. Small. Edinburgh, 1843.

Very few academical prize poems have ever attained extensive popularity beyond the walls of the College where they have originated. This is not so much due to the juvenility of their authors, for many authors as young as the generality of students have written popular poems; neither is it wholly owing to the seclusion of College life, and the isolation of the student from the tastes and sympathies of the every-day world, for many students have written well and popularly; but chiefly, we apprehend, is it to be attributed to the chilling and unpoetic influence exerted by the consciousness that the theme is a prescribed one, that the production is to be judged, not according to its own merits, but solely by comparison with competing productions, and that the reward of success will be no more than the congratulations of a hundred class-fellows, and the enrolment of the poet's name in the records of a university which probably no one will ever read. It is true that neither the seclusion of a College,—and that College, Oxford—nor the prosaic consciousness that he was writing for a prize, could smother the fire of poetical genius in the breast of a Reginald Heber; but yet how few have read even 'Palestine;'—how few of those who have read it could at this moment repeat a dozen of its lines. We have by us a volume of Cambridge Prize Poems, many of them the production of no mean minds, and yet we venture to say that any plagiarist might publish them all afresh, and the deceit would pass for months undetected. We therefore do not, in general, expect much from College prize exercises, and we are not in general much disappointed. But when we learned that a volume was to come forth with the strong recommendation at once of Professor Wilson and Professor Dunbar—of the author of the "Isle of Palms" and the author of the "Prosodia Graeca"—of the author of the "City of the Plague" and the author of the "Treatise on the derivation and signification of the particle ἄν"—of Sir Christopher North, whose wild

imagination scorns all restraints, and who lives ever in a world of brightness and beauty inhabited by infants with auburn ringlets and soft hazel eyes—and of Professor Dunbar whose rigidly correct judgment and taste are never disturbed in their exercise by the interference of any imagination at all,—when we heard that two such judges had concurred in lauding the productions of one and the same poet, we awaited with considerably excited curiosity the arrival of the vessel that was to convey to our shores the volume whose title stands at the head of this article, and which it is now our pleasing duty to introduce to our Readers.

The volume before us contains three poems of considerable length, besides some minor pieces. The "Highlands" is a descriptive poem, the "Scottish Martyrs" is of course historical, and "the Liberation of Greece" we may call, in the better sense of the term, sentimental. The minor pieces are chiefly paraphrases of passages of scripture, and several of them, we are told in the preface, have appeared before in the periodicals. The Highlands, the Liberation of Greece, and the longest of the minor pieces—"Imagination, a tale"—are composed in the Spencerian stanza, and the Scottish Martyrs in deca-syllabic rhyme.

The Highlands is an elaborate composition, combining almost the minuteness of the Guide-book with the grace and elegance of poetic diction. To say that the descriptions are graphic, is to say too little. Dozens of the stanzas are like so many landscapes framed and glazed, and others are more than even this. Some actually take you away to the mountains afar, and you see the very ripple of the surface of the loch as the joyous trout bounds for an instant from his element, as if he envied you that balmy air that you breathe, and would fain convert his gills into lungs like yours. The grasshopper stops his chirping song as you throw yourself recumbent on his velvet turf, and begins it again at a little distance from you. You see the falcon poised on his motionless wings far away up among the deep-blue ether, and cannot conceive that aught but peace is in his design, or that his ear is not tuned like yours to love the melody of the lark whose song enchants your soul. Again, you gaze on the dashing linn, and your glowing cheeks are bedewed and refreshed by the light-refracting spray, and you sympathize in your inmost soul with the turmoil of the watery war, and a strange mysterious desire steals over your spirit to mingle your being with that of the cascade;—you withdraw from the giddy ledge, and move down the stream till the roar of the troubled waters is softened into a peace-inspiring murmur like the monotonous hum of bees, and under the shade of the spreading beech you feel that you are alone with God, and meditate on all his dealings with his people in the days of other years.

But we shall best do justice to our author's descriptive powers by a specimen. Take the following selected almost at random:—

XXXVI.

But these are passed, and now the cheerful morn
Leads my glad footsteps through a lovelier scene,
Where birchen groves the teeming banks adorn,
With silver stem and small leaves fresh and green.
Here foaming falls flash bright with glistening sheen
There sweet Loch Echiltie enchants my sight,
Smiling with face so lovely and serene,
'Mid hills so glorious, and 'neath skies so bright,
The very trees around seem thrilling with delight.

XXXVII.

And onward still through a fair glen, that seems
Like a great peaceful Paradise, I go.
Round me, far stretching woods and rocks, and streams,
Beside me, the deep Conan's tranquil flow.
But, more than all, it glads my soul to know
That, 'mid those scenes through which my steps are wending,
The trees of righteousness abundant grow;
And oft from this calm vale is heard ascending
The praise of thousand hearts with Nature's anthem blending.

XXXVIII.

Here let me sit upon this heathy mound,
And commune with the glorious company
Of giant mountains rising all around,
And seeming each to Fancy's musing eye
With conscious life imbued. Some, shooting high
Their bare and rocky summits, seem to seek,
As if by one wild heave, to reach the sky,
Showing their rugged bosoms dark and bleak,
Like stern Ambition's breast, that counts all softness weak

XXXIX.

Not so, with restless effort, rude and wild,
Spurning the hills below in lordly pride,
Majestic Wyvis soars; serene and mild
As grand he rises; on his grassy side
The flocks find pasture, and the waters glide
Calm down his verdant slopes; nor doth he raise
One proud peak to the sky, but vast and wide
Swells his broad bosom; yet in vain the blaze
Of Summer on the snows that crown his summit plays.

XL.

And now, awhile, beside this placid lake
Calm let me rest, for gathering clouds forbid
My eager steps the upward path to take
To where the mountain heights in mist are hid.
Yet let the joy suffice me, here, amid
The whispering woods to rove that clothe the shore
Of the sweet lake whose waters, dark and red.
From Earth's rent bosom gushed, they say, of yore,
What time the offended sprite her breast in anger tore.

XLI.

Tracing the shady pathway, now I climb
With pensive steps the wild and woody height
Where burst at once the lovely and sublime,
Each in its own perfection, on my sight.
There tower the distant mountains in their might,
Here smiles the lake most peacefully below.
Yet vainly these conspiring charms invite
My steps to linger here, for I must go
To that still lovelier scene where Beauly joys to flow.

XLII.

With calm majestic sweep the river winds
Around a lofty isle with verdure crowned;
But soon a bolder course the current finds,
And thunders on with hoarse impetuous sound.
Stupendous cliffs its mazy windings bound;
Fantastic rocks amid its waters rise;
Luxuriant trees bedeck the enchanted ground,
Where fixed we stand, in mute and still surprise,
Chained to the magic spot with never-sated eyes.

XLIII.

From the cliff's verge how fearful to look down
Upon the silent floods, where, dark and deep,
Beneath the rocks that round them sternly frown,
Like tower and battlement and donjon keep
Of some strong castle of old days, they sleep,
Silent as waters in a moat might be!
Then turn to look where o'er the rocks they leap
Roaring, as if the floodgates of a sea
Were opened, and its waves rushed down with furious glee!

XLIV.

Still let me wander where thy waters glide,
Sweet Beauly, till their heaving breast they spread
Wide 'neath the sky. Nor let me turn aside
To mingle with the living, ere I tread
Culloden's silent moor, and with the dead
Hold awful converse, in the burial-place
Of thousand gallant hearts, whose blood was shed
In vain, blind, faithful struggle for—a race
Who were their country's curse, perfidious, proud and base!

XLV.

Oh! what a scene wherein, in saddest thought,
To muse—not o'er the wasting scourge of war—
But o'er the direr ruin sin hath wrought
In that whose overthrow is sadder far
Than slaughtered thousands,—ruined empires are!
How hath the Arch-deceiver—not in vain—
Striven with deep malice to pervert and mar
Man's noblest, warmest feelings, and to train
His blind infatuate dupes to prop his tyrant reign!

XLVI.

By various wiles the subtle Tempter works
In various bosoms:—here to open strife
He urges brethren on:—there darkly lurks
The midnight murderer with his treacherous knife,
Plotting against his guest's—his Monarch's life,
In Cawdor's gloomy towers, whose chambers now
My steps are pacing: and the unnatural wife,
From woman changed to fiend, with scowling brow,
Rebukes his fears, and calls to mind his desperate vow.

But the Highlands are not a mere congeries of stern rocks and lofty mountains and smiling valleys and placid lakes—they are, and have been, the abode of men, "of men of like passions with ourselves," and Mr. Small is not the man to forget that while the fancy of the poet may delight in solitude, the heart of the man is especially concerned with his fellow-men. "Homo sum; humani nil a me alienum puto"—The Highlands are classic ground. They have been since the isles were peopled the home of a brave and noble race. Their history and their legends are alike poetical: their every glen has been the scene of some deed of heroism, the theatre in which has been enacted some tragic scene. And now are they not occupied by men of warm hearts and high principles? Where are the blessed effects of the gospel of salvation more signally displayed? Where are there more virtuous citizens? Where are there more happy families? The social and the historical allusions are not the least valuable portion of the poem. We have hesitated as to whether we should select the allusion in connection with Iona to the introduction of Christianity into Scotland, or the account of the Massacre of Glencoe, as a

specimen of the author's mode of treating historical scenes. We prefer the former as more pleasing in itself, and as relating to an infinitely more important subject.

XXX.

Nor when arose—these regions to illume—
The Sun of Righteousness, did even *his* ray
Dispel at once these phantoms of the gloom,
Or chase dark superstition's clouds away;
Yet did it raise them higher, and display,
In the bright tints which even on them it cast,
That splendour which, when purer shone the day—
When from the sky these darkening clouds had passed—
Shed such a glorious light o'er heaven and earth at last.

XXXI.

No more o'er Scotia's rugged hills and isles
Religion's beams are from Iona shed;
And moulder now her old and hoary piles
O'er the low graves, where lie the mighty dead,
And holy men, who wont these scenes to tread;
Yet is it sweet to walk where they have trod;
Sweet is it, even in fancy, to be led
O'er scenes that have been Sanctity's abode,
From whence o'er all the land such priceless blessings flowed

XXXII.

And, Oh! if fancy such deep joy can give,
Shrined in the heart such scenes may well remain,
When we have gazed on them. Then let me live
Those hours of holy musing o'er again,
When, borne rejoicing o'er the Western main,
Far on the deep the sacred isle I viewed—
When rose upon my sight its ancient fane—
When on its hallowed shore entranced I stood,
And with its spirit felt my inmost soul imbued.

XXXIII.

It was on such a morn as that whereon
A light of influence purer far than aught
Yon glorious sun imparts, arose and shone—
Even that blest morn which o'er these waters brought,
From Erin's kindred shore, a frail bark, fraught
With a devoted band of heralds, led
By one whom God by His own Word had taught,
And by His Spirit fired with zeal to spread
The tidings of great joy through Him for man who bled.

XXXIV.

Calm rose that morning o'er these Western Isles,
Shedding on all around a tranquil ray.
Old Ocean brightened into peaceful smiles,
As rolled the darkness from his face away;
And glad he hailed that blest, auspicious day.
More joyful then, methinks, than e'er before,
Through Staffa's pillared aisles his matin lay—
Wont ever there its orisons to pour—
Would swell in solemn strains, his Maker to adore.

XXXV.

For o'er the Western wave, that hallowed morn,
A bright and glorious star, of ray divine,
Like that which led to where the Christ was born,
Arose—with cheering beams ordained to shine,
And be to these rude isles a sacred sign,
Pointing to where, with gifts of purer worth
Than brought the Magi from the Eastern mine,
They might repair to Him whose wondrous birth
Great glory brought to Heaven, and spake good-will to earth.

XXXVI.

Wide o'er these rugged realms its hallowed ray
Was poured diffusive; nor on these alone:
O'er Southern regions, stretching far away,
With blessed power its heavenly lustre shone;
And they who sat in darkness joyed to own
The healing influence of its tranquil light;
And where a Saviour's name was not unknown,
Even there it shone with beams more purely bright
Than 'mid the obscuring clouds till then had reached their sight

XXXVII.

In peaceful union here the brethren dwelt,
Studious of God's own Word—a holy band,
Eager to spread the heavenly peace they felt
In their own tranquil breasts, o'er all the land;
To bid the sacred tree of life expand
O'er nations perishing around, and give
Its blessed fruits, abundant to their hand,
That, eating of these fruits, their souls might live,
And from its shadowing leaves a healing balm receive

XXXVIII.

Ah! not in monkish solitude retired
Dwelt they, remote from men, in selfish ease;
But, with deep ardour and devotion fired,
They spread abroad the glorious truth which frees
From strong delusions, deadening, while they please
The heart led captive in the fetters wrought
By Superstition's hand, and formed to seize
The prostrate powers of feeling and of thought,
In the seductive snares of sense and passion caught

XXXIX.

Such glorious aim o'er all their feelings shed
A hallowing power, which purified from earth,
And sense, and self; and with strong impulse led
The champions of the Cross undaunted forth
To deadly warfare with the monstrous birth
Of the fell Powers of Darkness, that had reigned
With gloomiest sway o'er all the subject North.
Nor less resolved the struggle they maintained
Gainst the usurping power which held the South enchained

XL.

They called none master upon earth, nor bowed
The knee to the great Harlot who sits throned
On the seven hills, and blasphemous words and proud
Gives forth. One Lord and Lawgiver they owned—
One Intercessor—Him who bled, and groaned,
And died to save them—Him, the great High Priest,
Who bore their griefs, and for their sins atoned.
By Him from bonds of guilty fear released,
They bore not on their brow the image of the Beast.

XLI.

And when the pensive pilgrim wanders here,
And gazes on these ruins, frail and low,
While softly falls upon his musing ear
The solemn sound of Ocean's ceaseless flow:
Then holy feeling in his soul will glow,
More pure and sacred—more sublime and deep—
Than e'er deluded votary may know
'Neath proud cathedral domes, where music's sweep
And perfumed incense-clouds his sated senses steep.

XLII.

Yes! many a mighty fane hath since been reared,
And many a stately structure yet may rise,
Yet more than all that spot shall be revered
Where old Iona's ruins meet the eyes;
Where, mingled with the dust of ages, lies
The mortal frame of him whose blessed feet
First brought the glorious message from the skies
To Scotia's sons, and made this Isle the seat
Where pure Religion dwelt, and Learning found retreat

XLIII.

And, Oh! with calmly musing eyes to trace
Each holy relic, each memorial hoar,
That still adorns the venerable place,
And brings to mind all that it was of yore!
To stand upon the consecrated shore,
Oft trod by those who the glad tidings brought
To these once darkened regions; to adore,
Amid these sacred piles, in silent thought,
Him by whose Spirit led this lonely Isle they sought!

XLIV.

Oh! then what sweet and grateful thoughts arise!
Yet how subdued the swelling thoughts of Pride;
Standing where low the chief—the monarch lies!
How small a space suffices to divide
Hereditary foes—laid side by side:
Their deeds forgot—almost their names unknown—
All record of their lives to fame denied,
Save the rude sculpture of the hoary stone,
By ruthless storms defaced, and by wild weeds o'ergrown!

The "Scottish Martyrs" and the "Liberation of Greece" are in our estimation very decidedly inferior to the Highlands; and the reason is to us obvious. The author's soul is fully alive to the beauties of external nature, but cannot so well appreciate, nor consequently so well describe, the working of human passions. With the homely virtues of a happy peasantry he is indeed familiar, but the spirit that will lead a man to bid stern defiance to tyranny, and smile in the midst of fire and faggot he has never witnessed in actual exercise, nor has been able fully to realize. In the Scottish Martyrs there are however excellent passages. The versification is throughout unexceptionable, but the subject we apprehend is not one that the author would have chosen had it not been prescribed to him. The best passages in the poem are those in which he describes the calm beaming of the light of truth into the minds that had long been darkened by popish superstition. We quote a passage of very great excellence:—

But not by seeds of truth profusely sown,
Was that abundant harvest reared alone:
Watered by many a Martyr's blood it grew,
And by the Spirit's heaven-descended dew.
And not in vain thy children, Scotia, viewed
Their martyred brethren, calm yet unsubdued,
Unflinching yield to torture and to death,
Pouring in songs of joy their latest breath.
For gazing on that scene they well might feel
Aroused within their souls a kindred zeal,
And long to have that hope within their breast,
Which thus could death of all its stings divest:

And well, too, in their heart a scorn might rise,
For those who there looked on with gloating eyes,
In whose proud hearts th' anticipation swelled,
That thus the tide of Truth should be repelled.
So heaved the breast, so flashed the indignant eye
Of those who stood, no calm spectators, by,
When he* whose heaven-taught voice had raised again
The long unheard, almost forgotten strain
Of peace and joy that called mankind to trust
And live by faith,—by faith be counted just,—
He whose pure heart, with love to souls full fraught,
Anew the tidings of great joy had brought,
As back from southern realms the torch he bare
Lit from the fire God's hand had kindled there,
Soon as he shed its beams on Scotia's night,
Was crushed by those who feared and shunned the light.
Ah ! not unmoved they saw the gentle youth
Who fearless bore the standard of the truth,
Noble by all that's great in human birth,
But nobler by a birth-right not of earth,
Enticed in vain by many a glittering lure,
And choosing with God's people to endure
Afflictions, bonds, the prison, and the stake,
Rather than sin's alluring joys partake.
No, not unmoved they marked his peaceful mien,
Unawed by torture, and in death serene.
Calm 'mid the flames his joyful voice arose ;
It breathed no imprecation on his foes :
It called no fire from Heaven, no vengeful rod,
"To smite the foes of Zion, and of God ;"
But joined on Earth the strains that rise in Heaven,
To martyred saints by inspiration given,
"How long, O Lord, shall darkness veil the land,
How long shall mortals dare thy dread right hand ?
O Thou, who gavest thy life that I might live,
Into thy hands my trusting soul I give."
Yes, many a heart that long had sought to gain
Peace from Rome's pompous rites, but sought in vain,
Rejoiced as one who, outcast, poor, despised,
Has found some hidden treasure, to be prized
Above all price, when they beheld the power
Of Faith to comfort in the darkest hour ;
And deep their secret longings were to know
More of the source from whence such peace could flow.
Nor from that fount, despite the jealous guard
That closed it round, could they be quite debarred.
In lonely places, where it secret flowed,
They drank, and went rejoicing on their road.
Not in the wind, whose mighty, rushing sweep
Rends the strong hills, and whirls the darkening deep ;
Not in the earthquake, whose convulsive shock
Bids the wild floods rol[illegible]k, the mountains rock ;
Not girt with clouds a[illegible]rce, devouring flame ;
Not thus unto our land Jehovah came.
By wakeful hearts, lone listening there, was heard
The still small voice of the peace-speaking Word.

We trust the quotations we have made will induce those of our readers who can appreciate good poetry to buy and read the volume for themselves ; but now they are entitled to expect our editorial judgment on two important questions. *Will Mr. Small ever write a much better*

* Patrick Hamilton, who was of royal descent, and who, having visited Germany, was there instructed in the doctrines of the Reformation, which, on his return, he fearlessly disseminated in Scotland.

poem than those with which he has commenced his poetical career? and *will these poems attain to great or extensive popularity?* The great youth of the author might lead many to expect an affirmative answer to the former question, while by the praise that we have most heartily and sincerely bestowed on the Highlands we may be considered as pledged to a similar response to the latter, and yet we are constrained to answer both questions in the negative. The Highlands cannot be regarded as a juvenile performance. The author's powers are evidently mature. There is none of that lightness either of head or heart,—none of those glaring errors of taste joined with flashes of brilliancy and power, which in the productions of a young poet give evidence of better things to come. It is on the contrary the production of a mature judgment and of a pious heart. We will not say that it is tame, for it is not positively so; if it had been as far removed from perfection towards the side of *wildness* as it is actually towards that of *tameness*, the poem would have been very much inferior to what it is; but it would have raised our expectation higher of the place that Mr. Small is yet destined to attain in the republic of letters. We have said that Mr. Small's poem is not positively tame, and yet that its tendency is towards that side; and we know not how we can better bring this distinctly before the minds of our readers than by presenting a scene from the Scottish Martyrs and placing it in juxta-position with a corresponding scene from another poet.

> But now the joyous sun has mounted high,
> And sheds his genial influence from the sky:
> And as we look on that adoring throng,
> And list the accents of their sacred song,
> Well may we deem that every bosom glows
> In light that from a Sun far brighter flows.
> In various tones that holy strain is sung;
> And variously these hearts hath Nature strung:
> Yet, sweetly tuned by influence divine,
> In loveliest harmony they all combine.
> Old men, with furrowed brows and silvery hair,
> The reverend fathers of the flock, are there:
> Pure-hearted men, who from their youth had known
> The Scriptures,—and had made them all their own;—
> Had hid the law of God within their heart,
> That from His ways they never might depart.
> And thus into the wilderness they bore
> Within themselves a never-failing store—
> A copious feast, whereon even there to feed,
> To cheer and strengthen in the hour of need;—
> A well of living water, whence they found
> Refreshment, and could give to all around.
> And creatures innocent and young and fair,
> With artless minds and cheerful hearts, are there;
> Blest beings, early taught to raise their eyes
> In love and meek devotion to the skies;—
> To see the glory of their God displayed
> In the bright hosts wide o'er the heavens arrayed;—
> To bow, in simple, trusting faith, the knee
> To Him whom mortal eye might never see,
> But whom they worshipped with a filial awe
> As the great, secret source of all they saw.
> Yes, here is many a young and buoyant breast
> With holy feeling and deep thought impressed;

And in such simple babes the Lord ordains
The strength to be shown forth wherewith He reigns ;—
Even by their mouths to silence and confound
The foes and powers of darkness gathering round.
And, in the midst of that adoring band,
Behold the venerable pastor stand.
By the mild accents from his lips that flow,
And by his calmly beaming eye, we know
That he is one whose listening heart hath heard,
And glad obeys the charge of his great Lord,
"O comfort ye my people, comfort them ;
Speak comfortably to Jerusalem."
Full well he knows the glorious theme that best
Can bring repose unto the weary breast.
And ere the consecrated bread he breaks
That brings the Saviour's death to mind, or takes
The cup that figures forth the precious blood,
That on the hallowed mount for sinners flowed,
He pours his burning soul in one rapt strain
Of praise unto the Lamb who once was slain ;
And speaks of all the unutterable love
Of Him who left His glorious throne above,
To take our nature and our sins to bear,
That we, with Him, eternal bliss might share.
And in the shelter of this peaceful glen,
Far from the world and from the haunts of men,
Shall they not worship undistracted here ?
Shall not their breasts be void of earthly fear ?
Shall ought intrude their holy joys to mar,
Or with their sacred harmony to jar ?
Shall ought unhallowed enter to deface
The placid beauty of this holy place ?
Yes, there are hearts, unknowing how to melt,
Who ne'er the beauty of holiness have felt,
Who could rejoice with fierce and fiendish joy
These peaceful tents of Israel to destroy ;
With sacrilegious fury in to rush,
And these assembled worshippers to crush,—
To dash their altars broken to the ground,
And strew the sacred things defiled around.

No one could call this a tame sketch, and yet if compared with a similar sketch from the pencil of the Sabbath bard it will be manifest that it could bear a little more fire.

With them each day was holy, every hour
They stood prepared to die, a people doomed
To death—old men and youths simple and maids.
With them each day was holy ; but *that* morn
On which the angel said " see where the Lord
Was laid," joyous arose—to die that day
Was bliss. Long ere the dawn, by devious ways
O'er hills, through woods, o'er dreary wastes, they sought
The upland moors, where rivers, then but brooks
Dispart to different seas. Fast by such brooks
A little glen is sometimes scooped, a plat
With greensward gay, and flowers that strangers seem
Amid the breathing wild, that all around
Fatigues the eye ; in solitudes like these
Thy persecuted children, Scotia, foiled
A tyrant's and a bigot's bloody laws ;
There leaning on his spear, (one of the array
That in the times of old had scathed the rose.

On England's banner, and had powerless struck
Th' infatuate monarch and his wavering host,
Yet ranged itself to aid his son dethron'd,
The eyart veteran heard the word of God
By Cameron thundered or by Renwick poured
In gentle stream ; then rose the song, the loud
Acclaim of praise ; the whirling plover ceased
Her plaint, the solitary place was glad,
And on the distant cairns, the watcher's ear
Caught dolefully at times the breeze-borne note
But years more gloomy followed, and no more
Th' assembled people dared in face of day
To worship God, or even at the dead
Of night, save when the wintry storm raved fierce,
And thunder peals compelled the men of blood
To couch within their den , then dauntlessly
The scattered few would meet in some deep dell
By rocks o'er-canopied, to hear the voice
Their faithful pastor's voice , he by the gleam
Of sheeted lightening oped the sacred book
And words of comfort spake , over their souls
His accents soothing came —as to her young
The heath fowl's plumes, when at the close of eve
She mournful gathers in her brood dispersed
By murderous sport, and o'er the remnant spreads
Fondly her wings ; close nestling neath her breast
They cherished cower amid the purple bloom.

In what we have just said we have virtually given our reason for believing that the volume before us will not attain the popularity that it so well deserves. He that would be a popular orator, said Mr Cecil to Henry Martyn, must aim at cupola painting, rather than miniature ; the same remark might be applied to poetry. And the above extract from the " Sabbath" is a case in point. Its " effect" no one can doubt , but it will not bear very rigid examination. No dell is completely o'er canopied by rocks, no minister read the Bible to his people by the gleam of the lightning ; and yet of the thousands that have admired this passage it is probable that we are the first to point out these faults. And why ; just because men do not expect that delicacy of touch in a cartoon that they demand in a miniature. The one is intended to be gazed at from a distance, and to strike by its grandeur and imposing effect ; while the other is valuable only in so far as it brings out every lineament in all its accuracy ; the one attracts the admiration of the gazing crowd, the other touches the tenderest chord in the breast of affection.

We take leave of Mr. Small as of one from whom we have received a treat. Well should we have loved to climb with him the heathery steep ; and the better shall we think of the public taste, the earlier we hear of a new edition being demanded.

The Martyrs of Science: or the Lives of Galileo, Tycho Brahe, and Kepler. By Sir David Brewster, K. H., D. C. L. Principal of the united College of St. Salvator and St. Leonard, St. Andrews. &c. &c. &c. London: 1841.

It was said by one, that if virtue should appear on earth, embodied in a visible form, all men would hasten to worship her ; but to this it

was replied, that virtue did appear upon earth in the person of Jesus of Nazareth, and men persecuted and crucified her. And a similar remark might be made in regard to truth, which is to intellectual man what virtue is to moral man. Theorists declaim as to the paramount claims of truth; but they are only the select few who can appreciate or who actually love it; hence science has her martyrs as well as religion; and the humiliating fact is incontrovertible, let it be accounted for as it may, that the sincere lovers of truth, like the sincere followers after moral goodness, have ever been a small body, when compared with those whom interest or prejudice has enlisted on the side of error.

That the Athenians should have put the hemlock draught into the hand of him who brought down philosophy from heaven to dwell among them, does not very much surprise us; because the philosophy that was thus brought down would not dwell at peace with their passions and their vices; but when we read of men warring against philosophy in her own native heaven, we are led irresistibly to the conclusion that they hate her on her own account, and not merely on account of the inconveniences to which she subjects themselves; and such was the case with the persecutors of that trio of whom Sir David Brewster has become the martyrologist. Galileo, alas, philosopher as he was, did not either by precept or example rebuke the vices of his contemporaries; and although Tycho Brahe and Kepler were both men of good moral character, yet the anger of their enemies was certainly not excited by their puritanism or illiberality. Their crime was that of being in advance of their age, not in goodness but in knowledge, not in heart but in head; and therefore they are strictly as they are denominated in the volume before us, "Martyrs of Science."

It is mortifying in an extreme degree to those who are at once lovers of science and lovers of religion, that men have presumed to set the one in opposition to the other. We know not whether we should more condemn those who have attempted to deduce arguments against religion from the discoveries of science, or those who have profaned the sacred name of Religion by using her supposed interests as a pretext for the suppression of scientific truth. The sin of the former is more extensive perhaps in its immediate evil consequences: as he who attempts to overthrow true religion, that is Christianity, aims a blow at the happiness of the whole human race directly and immediately; but the sin of the latter is if possible more malignant in its intrinsic nature, and perhaps not even less extensive in its ultimate consequences. What Lord Bacon has said in reference to those excesses and crimes against civil government that have been perpetrated under the colour of religion, we may apply with the necessary adaptation to the persecution of science under the same pretext.—"It was great blasphemy when the devil said, *I will ascend and be like the Highest*; but it is greater blasphemy to personate God, and to bring him in saying *I will descend and be like the prince of darkness.* And what is it better to make the cause of religion to descend to the cruel and execrable actions of [constraining men under pain of death to declare that to be false which they have proved to be true, and shutting them up as prisoners because they have ventured to shew to men the greatness and the splendor of God's visible works]? Surely this is to bring down the Holy Ghost, instead of the likeness of a dove, in the shape of a vulture or raven; and to set,

out of the barque of the Christian Church, the flag of a barque of pirates and assassins."

There are not three greater names in the record of philosophic fame than those of Galileo, Tycho Brahe and John Kepler. The first by directing the telescope on the visible heavens, encreased immeasurably man's knowledge and physical power; the second carried on a series of observations for twenty years, which even at this day could scarcely be exceeded in accuracy; and the third, taking up the matter where his illustrious master stopped, paved the way to that elevation which astronomy has now reached, that of being the most accurate of all the physical sciences. And yet Galileo lived and died as a prisoner, Tycho Brahe as an exile, and Kepler in all but in name as a beggar. Galileo was the victim of priestly ignorance and fanaticism; Tycho of courtly envy; and Kepler of popular faction and princely unfaithfulness. Like the author of Hudibras, he sought for bread while alive, and got only a monumental stone nearly two centuries after his death.

These were pre-eminently the days of ignorance and prejudice; the days when Aristotle yet lorded it over the intellects of men, while an apostate hierarchy lorded it over their consciences. These were the days,—but we shall best tell what kind of days they were by one or two extracts from the volume before us.

The principal professor of philosophy at Padua resisted Galileo's repeated and urgent entreaties to look at the moon and planets through his telescope; and he even laboured to convince the Grand Duke that the satellites of Jupiter could not possibly exist. Sizzi, an astronomer of Florence, maintained that as there were only *seven* apertures in the head—*two* eyes, *two* ears, *two* nostrils, and *one* mouth—and as there were only *seven* metals, and *seven* days in the week, so there could be only *seven* planets. He seems, however, to have admitted the visibility of the four satellites through the telescope; but he argues, that as they are invisible to the naked eye, they can exercise no influence on the earth; and being useless, they do not therefore exist.

The President of the Council, Walchendorp—a name which, while the heavens revolve, will be pronounced with horror by astronomers—saw the change of sentiment which his injustice had produced, and adopted an artful method of sheltering himself from public odium. In consequence of a quarrel with Tycho, the recollection of which had rankled in his breast, he dreaded to be the prime mover in his persecution. He therefore appointed a committee of two persons, one of whom was Thomas Feuchius, to report to the government on the nature and utility of the studies of Tycho. These two individuals were entirely ignorant of astronomy and the use of instruments; and even if they had not, they would have been equally subservient to the views of the minister. They reported that the studies of Tycho were of no value, and that they were not only useless, but noxious.

But have these days passed away? Has our lot fallen in better times? Can men now investigate truth with the confidence that if they attain to important discoveries these will be joyfully embraced by their contemporaries; while if they fall into error, the appliances of pure reason will be applied to restore them? Reader, the following is not extracted from a black-letter record of the fifteenth or sixteenth century, neither does it relate to the doings of men in Madagascar or the Andamans. It is from a London Newspaper bearing date this current year of 1843. It refers to the author of the volume before us, a man whom all the philosophers in Europe have united in ranking as one of their chiefs, a man moreover who has made his profound investigations tell upon the saving of human life and the encrease of human comfort:—

ST. ANDREW'S UNIVERSITY AND SIR DAVID BREWSTER.

The heads of the Established Church of Scotland do not appear to be using their victory over the seceding party with the moderation or discretion that betokens a just cause. The English public were both surprised and disgusted to learn from Lord CAMPBELL, in the course of a recent debate in the House of Lords, that no less distinguished a person than Sir DAVID BREWSTER, has been singled out as the victim of a most discreditable and narrow-minded persecution on account of his conscientious adherence to the Free Presbyterian Church. One would suppose that a quiet philosopher might have been allowed to worship GOD when and how he pleased, without molestation or hindrance, and that respect for public opinion would have prevented any set of men from disgracing themselves in the eyes of Europe by such an exhibition of malice and intolerance. As the contrary, however, proves to be the case, we consider it due to the dignity of science and to the respect we owe to an eminent name, to expose the shameful proceedings to the unbiassed world by every means in our power. The facts of the case are these:—The heads of the University of St. Andrew's have transmitted a memorial to the Secretary of State for the Home Department, setting forth that "Sir DAVID BREWSTER, Principal of the United College, has seceded from the Established Church of Scotland, and joined himself to a hostile body of Dissenters, and has thereby, in the opinion of the University, disqualified himself from remaining Principal of the College." The gentlemen who have thought fit to adopt this extraordinary step to remove from his office the most illustrious ornament of their University, are Drs. BUIST, HALDANE, COOK, GILLESPIE, ANDERSON, REID, and Messrs. ALEXANDER, DUNCAN, and JACKSON. We are not aware that they have acquired any celebrity in the world of science or literature. The notoriety they are likely to procure for themselves is not an enviable one.

Rumours have come to our ears that other causes than a zeal for the interests of religion, or a regard for the fame of the University, may be assigned for this step. It is whispered that Sir DAVID BREWSTER has dared to lay his finger upon time honoured abuses and profitable corruptions, which in the course of years had been suffered to creep into that northern seat of learning, and to lessen its efficiency, and that these dark spots have been pointed out in his reports to the Royal Commission, now sitting for visiting that University. Be this as it may, it is very certain that, as he is a Whig as well as a Free Churchman, Sir DAVID is obnoxious to the partizans of Government, who, in that ancient seminary, are as intolerant as they are illiterate; and has paid the penalty of his contumacy in various ways and degrees, both socially and officially.

The Act of Security embodied in the Treaty of Union, 1707, provides "that all professors, principals, masters, or others, bearing office, in any university, college, or school, shall before or at their admission, acknowledge and profess, and shall subscribe to the aforesaid confession of faith, as the confession of their faith, and that they practice and conform themselves to the worship now in use in this church, and subject themselves to the government and discipline thereof, and never endeavour, directly or indirectly, the prejudice or subversion of the same, and that before the respective presbyteries of their bounds, by whatsoever gift, presentation, or provision they may be thereto provided."

The Act of Security was passed solely to protect the Presbyterian Establishment against Prelacy and Popery, but chiefly the former; and had no reference whatever to Presbyterian Dissenters, who had then no existence. After dissent had taken place, Dissenters were entitled by law to admission to University office, provided they signed the confession of faith, &c., and we even find that Episcopalian Dissenters have been admitted into all the Scotch Universities without signing any document, nay, not even the oath of allegiance.

The words "others bearing office," are declared by the Royal Commissioners of 1830 (including the last and the present President of the Court of Session, the present Lord Justice CLERK, Lord COREHOUSE, Lord MONCRIEFF, Lord MELVILLE, Lord ABERDEEN, Lord ROSEBERY, and Lord HADDINGTON) to indicate the Chancellor, Rector, and Dean of Faculty; and the same commissioners, in their report to his Majesty relative to the University of Glasgow, state more fully that "it is evident that the expression 'others bearing office in any University' includes the Chancellor, Rector, and Dean of Faculty, who have been returned as officers in the University, but have not been returned as having taken the oaths

or subscribed the confession of faith, and formula of the Church of Scotland."—*Glasgow Report*, sect. 3, p. 78.

Here, then, it is declared, that the Act of Security ordains that Chancellors, Rectors, and Deans of Faculty are equally bound with the Professors to practise the Presbyterian worship, &c.; but this obligation cannot be fulfilled by Episcopalians, and as we shall now see, has not even been exacted by the University authorities; whereas, all Presbyterian Dissenters may conscientiously sign the documents, referred to.

1. St. Andrew's.—The Duke of CAMBRIDGE, and many others, though Episcopalians, have been elected Rectors of the University—the Duke of CAMBRIDGE by the existing professors; Professor CONNEL, who teaches chemistry, has not been asked to sign the confession of faith, and Mr. HINDMARSH, who teaches elocution within the walls of the college, is a Dissenter. The foundation Bursars, who are coeval with the foundation of the college, are declared by the act of 1747 to be members or founded persons of the college, along with the principal and professors; and yet they are as frequently Dissenters as members of the Established Church. Of the five Ramsay Bursars, four are Dissenters, although these Bursars are declared to be "subject to the government of the Church of Scotland as is now established in archbishops, bishops, and presbyteries."

2. Glasgow.—Sir ROBERT PEEL, Lord STANLEY, Sir JAMES GRAHAM—all Episcopalians, and yet Rectors of the University of Glasgow, though bound by the act to "practise and conform to the worship" of the Scotch Church; Sir DANIEL SANDFORD, Sir W. JACKSON HOOKER—Episcopalians, and once Professors; Messrs. LUSHINGTON and RAMSAY—Episcopalians, and now professors.

3. King's College, Aberdeen.—Lord FRANCIS EGERTON, Chancellor; Dr. W. GREGORY, Professor and Secretary—Episcopalians.

4. Edinburgh.—The Lord Provost of Edinburgh, who is Rector, and the Town-council, who are patrons and visitors, may be, and have been, Episcopalians or Dissenters. Professor KELLAND officiates in Edinburgh as an Episcopalian clergyman; Professors FORBES, ALISON, GRAHAM, and Sir H. BISHOP—all Episcopalian Professors.

5. Marischal College, Aberdeen.—Duke of RICHMOND, Chancellor, Sir JOHN HERSCHEL, Rector—both Episcopalians.

The adherence to a church, not the established one, is a violation of the Act of Security, and infers deprivation of office. Then, Sir DAVID BREWSTER, principal of the united College of St. Salvator's and St. Leonard's St. Andrew's; Dr. JOHN FLEMING, Professor in Aberdeen, King's College, and the most distinguished naturalist in Britain; Dr. BROWN, Professor in Marischal College, Aberdeen; all of whom are members of the Free Church, exactly similar in doctrine and discipline to the established one—must be turned out of their chairs; and Professors KELLAND, FORBES, ALISON, GRAHAM, and Sir H. BISHOP, of Edinburgh; Professor GREGORY, of the Royal College, Aberdeen; and professors LUSHINGTON and RAMSAY, Glasgow, must be turned out of their chairs; while the Duke of RICHMOND, Lord F. EGERTON, and Sir John HERSCHEL must resign their official dignities, and all the Professors in Edinburgh be compelled immediately to sign the confession of faith, &c.

Thus, then, it appears that the triumph of Intrusionism will lead to the ejectment of the greater number of the professors and dignitaries of the Universities from their chairs and honours, and will leave every institution for the advancement of learning in Scotland a mere *caput mortuum*, or body without the brains, like the Established Kirk itself. We understand, however, that the only authority that can remove Sir DAVID is the QUEEN in Council, and we therefore trust he is safe from the malice of his enemies. The civil courts, we are told, cannot deprive him of his office at the bidding of either Presbytery or Senatus, because they have solemnly declared the law to be such as to entitle Episcopalians to hold chairs in Scotch Universities, and the blow which strikes down Sir DAVID must displace them as well. We should have been glad to have seen the legal decision upon which this point rests. However much inclined the Government may be to support the side of the Establishment, we cannot imagine it would add to that support by the exercise of a power as extraordinary as it would be oppressive. Yet the arbitrary and high-handed manner in which Sir JAMES GRAHAM is carrying his measures, leads us to fear that even this disgraceful application will meet with his sympathy and support.—*Atlas*, 12th Aug. 1843.

And who are these men that signalize themselves as the successors

of the inquisitors of Italy and the court economists of Denmark during the sixteenth century? There is but one man of distinction among them, and it is pleasing to see that his name stands last on the list, as if he had not been able, without a struggle with his better nature, to consent to the persecution of one whose merits he can in some degree appreciate. Dr. Jackson is a philosopher*; Mr. Duncan has published some good Mathematical books, from which we should infer that he is a good Schoolmaster, but has no pretensions to any thing higher. Drs. Buist, Haldane and Cook are in their right place at the head of such a list; Dr Gillespie was originally an adherent of that party in the Church to which Sir David Brewster still adheres; and we know that the order *Glires* belong to the class *Rodentia*, and of Drs. Anderson and Reid we have the good fortune to hear now for the first time.

We have never alluded to the disputes in the Scotch kirk, and even refrained last month when a favorable opportunity offered to express our sentiments on the subject. But when men under the mask of a zeal for religion will take a step that may probably issue in the deprivation of the universities of Scotland of some their brightest ornaments, and affix an indelible stain to institutions that we venerate and love, we cannot be silent. For Sir David Brewster's interests we fear not; and for the university of St. Andrews we are not specially concerned. Some good scholars have come from it, but that was in the time of Dr. John Hunter, and especially during the few years that Dr. Chalmers held one of its chairs, and attracted a large number of students who would otherwise have gone elsewhere. But it is evident that if the antiquated and obsolete law be enforced for the exclusion of Brewster from St. Andrews, it will necessarily exclude also some of the most distinguished men from Edinburgh and Glasgow. As humble advocates both of religion and of science we think it is due to ourselves to lift up our voice against the men who profane the one by uplifting its banner in a crusade against the other. And these are the men of moderation too! the men who talk loudly against agitation and clamour! the men who profess to venerate the institutions and establishments of our native land! Let it be known that their moderation consists in the desire to be let alone, that their hatred of agitation is a hatred of the exercise of thought and free enquiry, and that their veneration of the institutions of their country will at any time yield to their personal pique or irrilegious fanaticism. The accusation of Socrates was a strange document. "*Αδικει Σωκρατης ὁυς μεν ἡ πολις νομιζει θεους ὀυ νομιζων, ἑτερα δε καινα δαιμονια ἐισφερων· ἀδικει δε και τους νεους διαφθειρων.*" We should like to see how Sir David's indictment shall run. Somehow thus it must be—"Sir David Brewster has gone far before most of his contemporaries in the investigation of God's works.

* We know not how our memory so failed us as to admit the statement in the text. Dr. Jackson has, we now remember, been dead for several years. We think Dr. Anderson was his successor. The Mr Jackson who signalizes himself by his zeal for the purity of the University is Professor of Theology, whose appointment a few years ago we remember was esteemed a singular insult to the College, and especially to the church whose ministers he was to assist in educating.

His name is known over all Europe as one of the brightest ornaments of his age. His discoveries are more numerous than those of any other living man. He has endeavoured to discharge his duties as principal of the College of St. Andrews by exercising discipline upon drunken students. He has asserted the dignity of religion by refusing to submit his conscience to the authority of human power—THEREFORE he is unfit to be Principal of the University of St. Andrews.

SELECTIONS FROM BRITISH AND OTHER PERIODICALS.

PRACTICAL ESSAYS ON MILL WORK, AND OTHER MACHINERY. BY ROBERTSON BUCHANAN, ENGINEER.

The practical essays of Robertson Buchanan on "Mill Work and other Machinery" have long and deservedly held a distinguished place in the estimation of scientific and practical men. These Treatises are seven in number, and embrace several of the elementary parts of machinery. The first of these an "ESSAY ON THE TEETH OF WHEELS" appeared in 1808, and suggested to the mind of the author the idea of publishing a series of essays of a practical nature on Mill work, each distinct and perfect in itself, but yet so harmonising in general principle and "natural connexion,"—to use his own words,—as that they might form the parts of an entire system. In pursuance of this idea he published, in the following year, his "TREATISE ON THE SHAFTS OF MILLS" and in 1814 the remaining essays were given to the public under the title of "ESSAYS ON MILL WORK." These various treatises, though far from being the entire of Mr. Buchanan's publications on practical subjects, form the matter of the volume before us,—and one of a more valuable and interesting character we have not for a long time had the pleasure of perusing, nor one better calculated to afford the young engineer and mechanic a clear practical knowledge of the application of the principles of science to the various operations of mechanical labour.

The second edition of this work was superintended by the late MR. TREDGOLD, C. E. and this the third made its appearance under the able, zealous and *gratuitous* Editorship of MR. GEO. RENNIE, C. E. F. R. S. To the publisher, Mr. Weale, we can scarcely accord too much praise for the singular care and attention which he has devoted to the work and the mass of additional matter with which it has been enriched. Together with numerous figures embodied in the text, a folio volume of 70 splendid plates illustrate the several principles advanced in the work or exhibit additionally the inventions of the last 50 years, which, whilst they have rendered us independent of the uncertainties of mere manual dexterity and advanced the productive capabilities of our mother country more than a thousand fold, have either strengthened the weak hand of man or entirely freed him from many of the painful and laborious occupations by which his physical energies were too often overtaxed, undermined and eventually destroy-

ed. To subjects of this nature nearly fifty plates are given, and when we state that they are engraved by Lowry in his best manner, our readers will credit our assurance that nothing can be more perfect or beautiful in its kind than this portion of the work.

As opportunities occur we shall do ourselves the pleasure of laying before our readers such of these or of the original matter of the essays as we may conceive most fitting for the pages of our Review,—in the mean time we present from the appendix the following unique and interesting paper from the pen of Mr. James Nasmyth on Tools in which the use, value, and advantages of modern machinery over manual labour are set forth in a very popular clear and entertaining manner.

REMARKS ON THE INTRODUCTION OF THE SLIDE PRINCIPLE IN TOOLS AND MACHINES EMPLOYED IN THE PRODUCTION OF MACHINERY.

By James Nasmyth.

1. "The striking and rapid progress which has within the last thirty years taken place in the perfection of all descriptions of machinery, not only as regards a more complete and sound knowledge of the principles of mechanical or constructive science, as exhibited in the general arrangement of the parts, but more especially in respect to the *increased perfection of the workmanship*, which is now so generally met with in the vast variety of machines which are yearly sent forth, as it were to proclaim new triumphs over matter, cannot but lead us to endeavour to find a cause for so remarkable and important a feature in the history of mechanism.

2. In pursuing this inquiry, we shall find that the accumulated experience and skill in constructive science, which has resulted from a continually increasing demand for machinery, will only throw light on one portion of this interesting subject; inasmuch as increased experience alone will not sufficiently account for the almost mathematical accuracy and precision which we find existing in, and conferred on, the forms of the various details, whether of the most delicate or ponderous machines; to have produced which, were it even *possible* by manual dexterity and labour, would have entailed so vast an expense in construction, that neither in respect to quantity or price could we have ever hoped to be able (even with our present mechanical population increased tenfold) to have kept pace with the demand which has resulted from the increased perfection and facilities of production realized by improved mechanism.

3. Viewing abstractedly the forms of the various details of which every machine is composed, we shall find that they consist of certain combinations of six primitive or elementary geometrical figures, namely, *the line*, *the plane*, *the circle*, *the cylinder*, *the cone* and *the sphere*; and that, however complex the arrangement, and vast the number of the parts of which a machine consists, we shall find that all may be as it were decomposed and classed under these *six* forms; and that, in short, every machine, whatever be its purpose, simply consists of a combination of these forms, more or less complex, for the attainment of certain objects and performance of required duties. It therefore follows, that the more near to absolute mathematical truth we can have the forms of those parts, the more perfectly will the machine perform its duties.

4. Up to within the last thirty years, nearly every part of a machine had to be made and finished to its required form, by mere manual labour; that is, on the dexterity of the *hand* of the workman, and the correctness of his *eye*, had we entirely to depend for accuracy and precision in the execution of such machinery as was then required; consequently, the enormous expense which was incurred in such attempts, even in the production of comparatively simple machines, in most cases proved a formidable barrier to the supply of such as the increasing wants of civilization rendered desirable, and when at length the successful efforts of Watt and Arkwright produced such an entire revolution in the steam engine and cotton manufacture, and so disclosed to mankind such vast mines of wealth in the latent powers of production, and capabilities of every country, and as the only obstacle to the attainment of so desirable an end consisted in our almost entire dependence upon manual dexterity for the formation and production of such ma-

chines as were required, the necessity of more trustworthy and productive agents rendered some change in the system imperative. In short, a sudden demand for machinery of unwonted accuracy arose, while the stock of workmen then existing were neither adequate in respect to number or ability to meet the wants of the time, and but for the introduction of the principle which I am about to describe, we never could have attained to one-thousandth part of the bright objects which were then disclosed to view, and which have since been so wonderfully and amply realized.

5. The *principle* to which I allude consists in the substitution of a mechanical contrivance in place of the human hand, for *holding*, *applying*, and *directing* the motions of a cutting tool to the surface of the work to be cut, by which we are enabled to constrain the tool to move along or across the surface of the object with *such absolute precision*, that with scarce any expenditure of force, and, indeed, in most cases, none at all on the part of the workman, (as shall be seen presently,) we are enabled to produce any of the before-named elementary geometrical forms with a degree of accuracy, ease, and rapidity, as compared with the old, imperfect, *hand system*, as may well be considered a mighty triumph over matter; and the more justly so, when we behold the vast results which improved machinery is enabling us to bring about, all of which may, in a more or less direct manner, be traced back to the accession of power which we have acquired by means of the general introduction and application of *the slide rest principle.*

6. How it has happened that the inestimable merits of this contrivance have not been more justly appreciated, and lain as it were unobserved, it is difficult to account; it may be that its beautiful simplicity has been overlooked in the glare of dazzling results which it has produced; it is only by considering how we could "get on" without its important help, that the real value of this admirable contrivance appears before us in its true light.

7. It is not indeed saying at all too much to state, that its influence in improving and so extending the use of machinery, has been as great as that produced by the improvement of the steam engine in respect to perfecting manufactures and extending commerce, inasmuch as without the aid of the vast accession to our power of producing perfect mechanism, which it at once supplied, we could never have worked out into practical and profitable forms the conceptions of those master-minds who, during the last half century, have so successfully pioneered the way for mankind even after attaining the otherwise latent treasures of the material world, even although opposed by time, space, and the elements! I regret much that my limits will not permit me to trace in detail, through all their ramifications, the almost infinite benefits which have been conferred on mankind by our having (through means of this admirable slide rest principle) obtained a most complete and signal triumph over the material world. *The steam engine itself*, which supplies us with such unbounded *power*, owes its present perfection to this admirable means of giving to metallic objects the most precise and perfect geometrical forms. How could we, for instance, have good steam engines, if we had not the means of boring out a true cylinder, or turning a true piston rod, or planing a valve face? It is this alone which has furnished us with the means of carrying into practice the accumulated results of scientific investigation in mechanical subjects.

8. With a view to render the preceeding remarks more generally understood, I have given the annexed sketch, [See plate 29.] in order to illustrate the advantages of the *slide* rest principle, as a substitute for manual labour and dexterity, in the case of the turning lathe; the more so, as it was in this form and application in which its admirable merits became first known to the mechanical world.

9. Fig. 1. represents the system of hand turning in general practice previous to the introduction of the slide rest. Here it will be seen that the workman has no other means of applying and guiding his tool to the work in the lathe, than his mere unaided muscular strength, the expenditure of which, in the case of turning large objects, would be so great, that he could stand it for no length of time; and even if he were able, he would have to depend on his strength and dexterity alone for producing even the humblest and most plain class of work. By such means of this nature as were generally practiced before the introduction of the slide rest, we could only attain to any thing like true work, by an almost infinite expenditure of labour, for with the utmost care on his part he could not avoid occasionally cutting a little too deep, the consequence of which would be that he would require to go all over the rest of the surface, in order as it were to lower it to the level of the accidentally too deep cut just named; in most cases, in so doing, he would make the work too small, or have occasion either to leave

the mark in the bar, or else alter all his measures to suit the bad results of depending on the chance of his dexterity. It will be seen that the workman in Fig. 1. rests, or obtains support for, the end of his tool, so as to resist the force of the cut, by placing it upon "the rest" R.

10. Now let us just suppose that instead of holding his tool with his hands, that he had it bolted firm to this same rest, and that while it was cutting a shaving from the bar in the lathe, that he had means of *sliding the rest with its tool* along the bed of the lathe, parallel to the axis of the work, it is evident that, in so doing, we should be able to turn the bar quite true; and if a screw was provided for the purpose of giving this sliding motion, we should then have *a slide rest*; exactly in such manner was this truly admirable tool introduced to the mechanical world. On reference to Fig. 2, it will be at once seen that these objects are attained in a very simple manner. The tool is in this case held fast and firm by a species of iron hand or vice, while it is constrained to move in a definite direction by means of the slide S, (see Fig. 3,) the sliding motion being communicated by the hands of the workman to the screw handle H, the required depth of cut being regulated by the under slide K, operated upon in like manner by a screw and handle; so that by the separate or combined motion of these two slides, the point of the tool can be made to traverse along or across the work as required, with an expenditure of power on the part of the workman so trifling as scarce to be appreciated; and with such a degree of definite and precise accuracy will the tool by these means move, that, after setting the tool to work, he needs not to look at it so long as he simply keeps turning the screw handle; and by a very simple contrivance, which we have endeavoured to exhibit in Fig. 3, X, the attendance of the workman is entirely dispensed with by the introduction of the *self-acting principle*, by which the revolution of the work in the lathe is made to supply the place of the hand of the workman. As may be seen at X, Fig. 3, by simply fixing to the work in the lathe a piece of iron as at O, and placing on the end of the screw S of the upper slide a star wheel X, it is evident that at each revolution of the work in the lathe the end of the iron finger X will come in contact with one of the teeth of the wheel, and move it round a tooth at each turn, bringing the next in succession into a situation so as in like manner, at each revolution of the work, the screw wheel X is moved round, and the tool by that simple means slid by successive steps along the surface of the work; here, then, by this simple adaptation, we have not only done away with necessity for a dexterous workman, but have entirely removed all necessity of attendance whatsoever during the progress of the tool over the slide length of the surface of the work.

This will in some degree convey an idea of the nature of the *self-acting principle*, by the adoption of which we are enabled to elevate to so high a degree the productive powers of our workmen and machinery. There are a vast variety of modes of attaining this self-acting motion, but the one above alluded to will be sufficient, the more so as it is the most generally employed, and most simple.

11. It was this holding of a tool by means of an iron hand, and constraining it to move along the surface of the work in so certain a manner, and with such definite and precise motion, which formed the great era in the history of mechanism, inasmuch as we thenceforward became possessed, by its means, of the power of operating alike on the most ponderous or delicate pieces of machinery with a degree of minute precision, of which language cannot convey an adequate idea; and in many cases we have, through its agency, equal facility in carrying on the most perfect workmanship in the interior parts of certain machines, where neither the hand nor eye can reach, and nevertheless we can give to these parts their required form with a degree of accuracy as if we had the power of transforming ourselves into pigmy workmen, and so apply our labour to the innermost holes and corners of our machinery.

12. It would be blamable indeed (after having endeavoured to set forth the vast advantages which have been conferred on the mechanical world, and therefore on mankind generally, by the invention and introduction of the slide rest) were I to suppress the name of that admirable individual to whom we are indebted for this powerful agent towards the attainment of mechanical perfection. I allude to the late Henry Maudslay, engineer, of London, whose useful life was enthusiastically devoted to the grand object of improving our means of producing perfect workmanship and machinery; *to him* we are certainly indebted for *the slide rests*, and consequently, to say the least, we are indirectly so for the vast benefits which have resulted from the introduction of so powerful an agent in perfecting our machinery and mechanism generally. The indefatigable care which [illegible]

generally, sound ideas of practical knowledge and refined views of construction, has rendered and ever will continue to render his name identified with all that is noble in the ambition of a lover of mechanical perfection. The vast results which have sprung from his admirable mind, is his best monument and eulogium.

13. The vast practical advantage which resulted from the substitution of "the slide rest" in place of the hand in the process of turning, had its natural effect in causing its adoption and application to other important processes in constructive science. So striking and certain were the effects and advantages as respects the superior quality and cheapness of the work produced by its means, that it soon induced a very marked change in mechanical designs, inasmuch as this, that many improved arrangements in mechanism had been kept back from the vast expense attendant on the employment of certain forms in the parts, such as perfectly true cylindrical rods or circular or flat surfaces, which the important aid of the slide rest now renders so cheap, (comparatively speaking,) that every practical engineer, in making out his design in detail, had only to keep in mind the vast capabilities and powers of the slide rest, to enable his fancy to luxuriate in the introduction of the most perfect geometrical forms, as not only attainable in practice, but actually *the cheapest* forms through whose agency he could attain his object. I have every reason, indeed, to call the introduction of the slide rest a great era in the history of mechanism, as every piece of machinery which was produced by its agency, bore such evident marks of superiority, as very rapidly and extensively proclaimed to the mechanical world that a great step (leap forward, I should rather say) had been made, and in proof of it, we have only to look around us at this day to see what is doing by improved machinery, to place beyond doubt what I have stated as to this era in mechanism—"the introduction of the slide rest."

14. Were I to attempt to trace in detail the almost infinite application of the slide rest principle, I should require to describe almost every machine which is employed in giving definite forms to materials; but as such would be incompatible with my limits, I shall confine myself to one or two of the more generally used and important applications; and in endeavouring to do so, I shall, for the sake of clearness, avoid those minute details which, although most frequently combined with the slide principle, yet are so subordinate, and so frequently varied according to the taste of the engineer, that it is best to strip them from the simple illustrations I have endeavoured to give, so as to leave, as it were, more prominent and conspicuous *the principle* of the machine.

15. I cannot properly introduce to the attention of my readers a more worthy and truly important immediate descendant of "the slide rest" than *the planing machine*, which has done more within the last 10 or 15 years for reducing the cost, and for extending the use of perfect machinery, than had been the case by all the improvements in mechanism for the last century.

16. There is no form which is so frequently required and essential to any piece of mechanism as the plane surface, or rectangular prismatic forms generally.

17. The vast expense attendant on the production of such, by the tedious and unsatisfactory process of chipping and filing, caused every engineer to avoid by all means any arrangements which rendered such forms necessary, however essential they might be to the perfect action of the machine. It is quite laughable to observe, in any old piece of mechanism, the niggardly use of those important forms arising from the above obstacle. The introduction of the planing machine at once altered the entire system, inasmuch as forms and arrangements became practically possible, which formerly the engineer dared not think of using. This was simply following out in the plane surface, what the slide rest had produced in the turning lathe as regards cylindrical forms; and the result was, that not only was the machinery produced by its agency most strikingly superior, by its direct influence, but also as the planing machine enabled us to produce *improved tools* at so very much reduced cost, that mighty principle in all affairs (namely cause and effect tearing each other alternately.) The first planing machine enabled us to produce the second still better; that again produced a better still; and now slide rests of the most perfect kind came streaming forth from them, and they, again, assisted in making better still; so that in a very short time a most important branch of engineering business, namely, tool-making, arose, which had its existence not merely owing to the demand pre-existing for such improved tools, but in fact, raised upon a demand as it were of its own creating, and all this caused by the slide rest, and its offspring, the planing machine. One has only to go into any of those vast establishments, which within the last 10 years have sprung up for the purpose of supplying the demand for machinery, and we shall find that

nine-tenths of all the fine mechanism in use, and in process of production, is through the agency, more or less direct, of *the slide rest and planing machine.*

18. Figure 4 represents the general arrangement of parts existing in most planing machines. It consists of two principle parts, namely, the bed B on which the table T slides by certain mechanism backward and forward, so that any piece of work, W, being bolted to it, partakes of the same, as if it were a part of the table T; the table T being constrained to move in a perfectly straight line to and fro, by its sliding on the two angular ridges, C C.

19. Over the table T is fixed "a slide rest" S, which is held fast by being bolted to the two upright standards N N. This slide S has a transverse slide D, which serves to hold the tool in such a manner that it may be lowered down and adjusted so as to cause the tool to take a cut more or less deep as desired, which adjustment is performed by the handle L, so that every time the table and the work fixed to it moves to and fro, the tool in the down slide D, is by certain apparatus moved each time a little way across the table, so that by a repeated series of sliding backwards and forwards of the table, the tool is made to traverse the surface of the work, and in so doing it transfers the perfectly true figure of the slide S, on to that of the surface of the work W, and so produces a perfect plane surface. I trust an inspection of the figure will do more to render this clear, than any further attempt at description.

20. As to the means of giving motion to the table as also to the screw of the slide S, it is not required here to enter into such details, as they vary so much according to the fancy of different makers, who have each their peculiar fancy as to the best arrangement.

21. An inspection of the figure will, I trust, satisfy any one that this machine is derived from the slide rest, for the slide S is nothing more than a slide rest, held to its work by the two standards N N, while the work W represents a surface on the lathe, which is made to move in a straight line, in place of a revolving motion, as it would have done had it been a cylindrical surface being turned in the lathe. This, indeed, is my main object in giving this figure, as it serves to show that it is to the slide rest system that we are indebted for the planing machine, however varied the constructive details of such planing machines as we meet with may be, yet we shall find that they all embody the above principal arrangements, and are all slide rests for turning, i. e. planing *flat* work.

22. Again, in the case of the screw-cutting machine, we shall find (Plate 30. Fig. 5) that it consists simply of a slide rest, which receives its sliding motion from the revolution of the spindle or work in the lathe. I have chosen the latter, as it tends to render the arrangement more distinct.

Here we have the slide rests, whose tool-holder is slid along by means of the screw S, which receives its motion from the work in the lathe, by means of the wheels W W, by which it is evident, that as the work X revolves in the lathe, a revolving motion will be transferred to the screw S, and the point of the tool will, sliding along, have a spiral or screw on the work; and according to the respective diameters of the wheels W W, so shall we have a screw formed on X, more or less fine in the pitch of the thread, according to the proportions of the respective diameters of the wheels W W, as in the figure W or the work, is twice the diameter of W or the end of the slide screw. The pitch of the thread on X will be twice as wide as on S, and as S and X are revolving in opposite directions, we shall have a right hand screw on the one, and a left hand screw on the other, or the reverse, according to the nature of the guide screw S; and by placing an intermediate wheel between W and W, we shall then cause them to be either both right hand screws, or both left, as the case may be; the depth of cut is given in succession, by the set or transverse adjusting screw N.

23. Again, in the case of the wheel-cutting machine, we have the slide rest in full existence. See Fig. 6.

24. All wheel-cutting machines, however complex they may be in their minor arrangements, consist of two essential parts, the slide rest S, which holds the revolving cutter R, and the spindle T, on which the wheel W, which has to be cut, is fixed. This spindle is made part of the dividing wheel D, by fitting into a socker or chuck, so that when the head D is moved round in successive steps, or according to the required divisions on the face of it, which is set off or divided and held fast by the index point or holder X, it is evident that whatever be the divisions or fractions of the divided circle D, we move round step by step; the same will be most faithfully transferred to the wheel W, which we desire to cut or divide into teeth; and by means of the slide rest S, we slide the revolving cutter across the face or edge of the wheel W. It is likewise evident, that we must thereby cut

a tooth every time we slide the cutter across, after each division is taken in succession by the shifting of the head or dividing wheel D.

This is a very meagre description of the principle of a most important machine, in which, as in innumerable other instances, the slide principle enables us to produce with such facility, results in the form of workmanship, whose mathematical accuracy throws all *hand* work utterly into the shade, not only as to absolute precision, but also economy of production.

25. As before said, were I to endeavour to trace in detail the countless applications of the slide principle from its first appearance before the mechanical world, as introduced by the late celebrated Henry Maudslay, and follow it down to the present time, a thousand pages would not give space for all that might, with such truth and justice, be said on the advantages which mankind have been and are now deriving from the slide rest, and it lineal descendants.

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26. *Some Observations Respecting the Form of Tools employed in Turning and Planing Iron, Brass, &c.*

Hitherto, so far as I am aware, the form of tools employed in turning or planing iron, &c., has not either received that attention which the importance of the subject calls for, nor has any attempt been made to reduce the subject to such plain and general principles of which it is not only capable, but when so treated, then only adapted to be of service to those in whose hands the management of such tools is for the most part entrusted. Indeed, so much practical importance attaches to this subject, that the quality as well as the quantity of work produceable from turning lathes and planing machines, entirely depends upon the skill of the operator in giving to his tools the proper form. There are many excellent workmen, who, by a species of intuition, have acquired the art of giving to the tools either the true form, or so near have they got to the true principle, that by holding to and repeating again and again that form which they found the best, they are enabled to produce the required result. But even with such, when a case occurs in which they have to go a little out of their usual routine, they are then as much "at sea" as if they knew nothing about the matter. This arises from no other cause than the want of the knowledge of the general *principle*, which would guide them to the true form, whatever be the case; and moreover, now that slide lathes and planing machines are becoming so very common in the workshops of engineering establishments, and that such machines, from their automaton power, no longer require regularly bred mechanics to attend them, it becomes more than ever necessary to reduce the subject to those simple principles to which it is capable, so that the subject may be brought within the range of the *supposed* inferior capacity of a humbler grade of men, from whom we want no more than careful attention to secure the best results from those surprisingly productive machines. We shall now proceed to the subject of these remarks, and with that view shall take, in the first place, the most simple case.

The chief, and indeed the only point which we require to consider, is the direction in which we wish to cut or penetrate the metal. Suppose, therefore, the plane AB (Plate 30. Fig 7) is the surface of a plane of metal, from which we wish to cut off shavings, in the direction AB, either by AB moving against the tool, or the reverse, namely, the tool moving against it, for it is the same action in either case. Suppose we were to employ such a tool as No. 1; in this case we should have little or no penetrating quality in the form of the tool, which would in consequence not cut, but *rub* off the particles, or crush them off by sheer brute force. The reason of this is, that we have given it so very blunt or obtuse an edge at the point of cutting, that by their coming against it at right angles to its face, the whole force which moves the plane AB will be consumed in merely rubbing off (not cutting) the particles of metal.

Next, in the case of No. 2, which *looks* more like a tool that would cut, we shall find that there again we should fail to produce the required result, and also encounter other evils, In this case we still have no more penetrating property in the direction AB, for the force of the tool is still in the same position, with regard to the surface to be cut, as in the instance of No. 1, that is, it is at right angles to it, so that we have no advantage here; and what is far worse, we have from this tool a penetrating quality, in a direction quite opposite to that which we desire, namely, in the direction CD. In moving the surface AB against this tool, No. 2, we should, on attempting to take a cut, find that the penetrating quality in the direction CD, would immediately exhibit itself in a series of saw, teeth-like marks, more or less [illegible], according to the strength of the cut and

that of the tool, which indeed would, on account of its form, not preserve its point entire for a moment, but would be snipped off with little or no force, because the cross section of metal at its point is scarce measurable. This is the most usual error in the forming of tools, that is to say, because they *look* sharp, that is thought sufficient; forgetting altogether the direction in which the strain is to be applied, and in consequence not providing sufficient metal for a cross section in the direction of the strain.

If we look to No. 3, we shall find that all these requisites are provided. In the first place we have a high degree of acuteness in the direction of the cut, namely A B; then as to strength *behind* the point we have all the metal from E to F to give the point E the requisite support; in short as regards strength, we have as much more strength in the case of No. 3. over No. 2, as the distance E F is greater than C, No. 2. Besides this great strength which we have in the case of No. 3, we have also another advantage of great moment, namely, the entire absence of all tendency to chatter or produce a rippled surface, F E acting as a most complete *stop* to any risk of digging into the surface which we are planing or turning, which would inevitably be the case with No. 2, supposing the point to be capable of resisting the force, which it could not. The very form of the shaving in the case of either of these tools, would exhibit the relative advantages of each. In the case of No. 3, they would be most complete curls, as may be evident from the form of the tool.

In No. 1, therefore, we have strength, but no acuteness in either direction.

In No. 2 we have acuteness, it is true, but in a direction quite opposite to that in which we require it, and *no strength.*

In No. 3 we have acuteness entirely in the direction in which we require it, and the greatest degree of strength.

We may therefore establish from this attempt at investigation, the following principle, namely, that in forming and setting a tool to cut any surface, we have only to attend to placing it so that the *end of it forms the least possible angle with the surface to be cut*, and whatever degree of acuteness be considered proper let the keenness be given by hollowing out the surface E C, as given Plate 30. Fig 8.

I again repeat the principle, namely, that in forming the cutting tool, what we have to attend to is, to let the end of the tool be as nearly parallel to the surface to be cut as possible, and any acuteness that may be required, shall be given to the surface on which the shavings slide; the very same holds good in the case of turning tools, and indeed in every tool, from a razor or carpenter's chisel up to the most enormous and powerful tool in a lathe or planing machine. In the case of turning, we may see the application of the "principle" very clearly exemplified.

Here we see (Plate 30. Fig 9) No. 3 as a turning tool, A B being a portion of a cylindrical bar in the lathe; E F should be as near as possible a tangent, that is, at right angles to the radius of the curve.

In the case of No. 2. (Plate 30. Fig 10) employed as a turning tool, we should not be able to preserve its point for an instant, as will be evident from the small cross section at C.

When *scraping* is all that is necessary, which is a last finish just before preparing the work to be polished, No. 1 may be employed with advantage, as in that case its low penetrating quality in both directions becomes of much service, but *then* it is not desired to employ it as a *cutting* tool.

In the instance of a common joiner's plane, we shall find the same principle carried out most fully; in Plate 30, Fig 11, E F is the plane iron, A B being as before the surface to be cut. In the case of this tool, an artificial end is given to the cutting tool, by means of the sole of the plane, which gives the requisite non-penetrating quality in all directions, except that in which we require to remove the material, or take the cut, namely, A B.

The same again is seen in the action of a chisel or hatchet. It will be observed that the bevelled surface of the chisel is always placed *outwards*, and the flat surface placed next to the wood which we are about to cut, so that the angle between the face of the chisel *next* the wood, and the surface of wood, shall form the *least possible* angle with it. See Plate 30. Fig 12.

Also, in forming *drills*, we shall find the very same principle in action, as has been given in the foregoing examples. Thus, H being the end view of a drill, the edge O P should be the least possible prominent, or out of the plane of the surface of which they are the edges, O S being less prominent than O P, so that there may be as little penetrating quality at the edge O P as possible. (See Plate 30, Figs 13 and 14.) A drill so formed, will cut the smoothest holes without any chattering which is so commonly the case when the edges are bevelled very much back, as

given at n, Fig 15. Such a drill would very soon lose its edge, and would cut a very rough hole besides.

In order to give great keenness to the edge of the drill, we have only to apply the same principle as before stated, in respect to turning tools, by hollowing out a groove at x, on each cutting face. Fig 16 and 17 Plate 30.

Fig 18, Plate 30, is a sketch of a very convenient and simple tool gauge, for enabling any one to ascertain whether a tool is ground or formed to the proper angle. It consists of a planed plate of metal, AB, on whose surface there is at one end fixed a conical steel pin c. whose taper or angle formed by the sides of the cone with the surface of the plate AB, is just that which is proper for the cutting face of the tool c, being a *cone* given in a very simple universal guage for every kind of tool, such as seen in Fig. 19. By using this gauge, all difficulty of forming the tools, to the proper angle, is at once removed.

And the same gauge will answer for every kind of planing or turning tool whatsoever, and of whatever size. A B may be about 15 inches long, by 5 wide, and about ⅜ths of an inch thick; these dimensions are by no means absolutely requisite, but will be found generally useful.

The angle formed by the sides of the cone, and the surface of the plate, should be about three degrees.

THE BEAGLE'S VOYAGE.

(From the Hobart Town Advertiser.)

The voyage of her Majesty's surveying vessel Beagle having been completed, it may not be uninteresting to the readers of this journal to be informed of the result of the work that has been performed by the tenants of her wooden walls since her arrival from England in the year 1837.

The objects of her voyage were not confined to one spot or portion of the coast, but generally to complete all parts that had hitherto escaped the notice of, or had not been visited by, previous navigators; particularly, portions of the north-western coast which were not seen by Captain Flinders and King, or by the French expedition under Commodore Baudin, in the year 1802.

The Beagle left England originally under the command of Captain J. C. Wickham. This officer, however, after two harassing voyages to the north-west coast—in which several interesting points were established, and two rivers (the Adelaide and the Victoria) discovered—was necessitated to return to England, on account of bad health, and the command devolved upon Captain J. L. Stokes, who has completed the objects of her voyage, and now takes her home—to receive, it is hoped, the reward of his long and useful services.

To describe the work performed, in the succession in which it was executed, would be out of place here. It is better therefore, to give a general summary of the different portions of the survey in the order, as to position, in which they follow each other.

Commencing, therefore, with the eastern coast. The inner route towards Torres Straits was twiee navigated on the way to the north coast, and several important corrections and additions made to the charts now in use. Of the latter may be mentioned, the determination of a better outlet than the one to the north of Wednesday and Hammond Islands, viz., by passing through Endeavour Strait, which has hitherto been considered to be too shoally for vessels of large burthen. Captain Stokes has, however, ascertained that, by keeping nearer to Wallis' Isles, a good channel or outlet exists in which there is not less than five fathoms water. The passage, therefore, through this part of Torres Straits has been very much improved.

The next important feature of the Beagle's voyage was the discovery of two considerable rivers at the bottom of the Gulf of Carpentaria, flowing through a fine country in a south-westerly direction, navigable for thirteen miles for vessels of thirteen feet draft, and to within five miles of where the water is fresh; the boats, however, traced it for nearly fifty miles farther, to the latitude of 17 deg. 59 min., and longitude 139 deg. 30 min*. The climate was found, in the month of August, to be of an agreeable character, the thermometer indicating an average temperature of 60 deg., the minimum being 50 deg. To these rivers the names of "Albert" and "Flinders" were given. The character of the country is low, and the soil chiefly alluvial. No satisfactory reason has been given for the low average temperature of this tropical region, which, as the latitude is about 17 deg.,

* Within 350 miles of the centre of the Continent.

ought to have been at least 70 deg. or 75 deg. The situation of these rivers may at no distant period open a road to the interior, which is at present wrapped up in doubt and mystery.

The next discovery in succession to west was that of the Adelaide River, at the north-west part of the Gulf of Van Diemen, similar in character to the Alligator Rivers, which were discovered in the year 1818, falling into the gulf at its southern part. Proceeding farther, another river was found of more importance, as to size, than any previously known to Intertropical Australia. It was called the "Victoria." It extends for about one hundred and fifty miles to the south-east by east, and is navigable for vessels of burthen for sixty miles from entrance; its farther examination was made by a pedestrian party to the latitude of 15 deg. 36 min. and long. 130 deg. 52 min. and was left still flowing from the south-east. This position is about five hundred miles from the centre of the Continent. The character of the river may be better understood from the following extract from Captain Stokes's journal:—"The valley through which the river passes varies in its nature, from treeless, stony plains, to rich alluvial flats, lightly timbered with a white stemmed gum: the banks are steep and high, thickly clothed with the *Acacia*, drooping *Eucalyptus*, and tall reeds. There was no perceptible stream in the upper reaches: but if we may judge from the inclination of the stems of the trees growing in the bed, and heaps of large boulders in the channel of the river, the Victoria, at some recent period, must have been a large and rapid river."

Whilst employed in making observations at Cape Pearce, which forms the north entrance of this river, Captain Stokes was treacherously speared by the natives; the wound was a severe one, but assistance being rendered, his life was happily saved. It is a curious coincidence, that the three officers whose services in the late expedition have been most prominent, viz., Captain Stokes, Mr. A. B. Usborne, master, and Mr. Fitzmaurice, mate, each met with serious wounds in the prosecution of their duty: Messrs. Usborne and Fitzmaurice from muskets accidentally exploding; the former was obliged to invalid in consequence, and the latter, who, however, has persevered to the last, will be lame for life.

The rivers Albert and Flinders to the eastward, and that of Victoria to the westward, converge in the direction of their sources apparently to one common point; to which also do the intermediate rivers, the Alligator and the Adelaide. It seems probable that all derive their origin from some large inland marsh or lake*, to which they serve as drains. It is not unlikely that there may be a low tract of land between the Gulf of Carpentaria and the Great Horseshoe Swamp, found by Mr. Eyre in the northern part of the province of South Australia.

With respect, however, to the climate of the country in the neighbourhood of the Victoria, the temperature ranging between 95 and 110 deg., was found by the Beagle's officers in the month of November to be almost insufferable, and quite different to that experienced at the Albert, in the Gulf of Carpentaria. It would seem by Captain Stokes's description, above inserted, to resemble in character the country about Cambridge Gulf, which has its embouchure to the sea a short distance to the westward.

The next part of the north-west coast visited by the Beagle, was the opening that was supposed to exist at the back of the Buccaneer's Archipelago. Perhaps no part of the whole coast promised to be of greater interest, and raised hopes of the existence there of a large river, hopes that were justified by the great rise and fall of the tides, which exceeded thirty-six feet. It was however, found to be but comparatively unimportant indentation, the eastern part, or Collier's Bay, being nothing more than a shallow sinuosity of the coast line, and the western part narrowed gradually into a tolerably extensive sound, terminated by Fitzroy river, which was traced for twenty-five in a southerly direction, draining the low land from and through which it flowed. The opening near Cape Latouche-Treville, which was thought also to be another outlet of the supposed river, or else the mouth of a second, was an open bay not affording even sheltered anchorage. The interval between this part and Depuch Island, was also explored, but not found to contain any inlet or feature of importance. It is generally a sandy and low sterile coast, fronted by a shoal approach and several sand-banks, the positions of which were ascertained. The Monte-Bello Islands were also correctly and minutely surveyed, as also some rocks in the neighbourhood, which are doubtless the Trial Rocks of former navigators.

On the west coast, the Houtman's Abrolhos was also explored and surveyed, together with the coast within it, where the fertile appearance of the coast gave

* [illegible]

strong indications of the presence of a country favourable for settling. It is here that Governor Grey recommended the Australian Company to establish themselves. Fortunately, however, they had located themselves at the inlet Port Leschenault; for they afterwards ascertained that the former would not have suited their wants. Several new anchorages about Rottnest and Gage's Road, off Swan River, were also examined and surveyed, in which much advantage will be derived by the colonists at Western Australia.

South Australia has also had the advantage of the Beagle's services in the survey of the anchorage and port at Adelaide.

But perhaps the most important, because useful, work performed by the Beagle has been the detailed survey of Bass's Strait, which has been just completed by Captain Stokes, with the aid of the Government of Van Diemen's Land, which, in the most liberal way, at once acceded to the request of Captain Stokes, by devoting to his services the use of the colonial cutter Vansittart for the survey of the southern portion of the eastern entrance of the Strait. The command of the vessel was temporarily given to Mr. C. C. Forsyth, the mate of the Beagle*.

The result of these labours has been the completion of the survey, in which the proper and relative position of the various head-lands, capes, and islands, which are so prominent and numerous in the Strait, are laid down; with the tides, soundings, and description of several new anchorages, in a manner that cannot but be of immense importance to the commercial interests of the colony. Much important information, relative to the entrance of Port Dalrymple, as well as that of Port Philip, and the channel within it, the approaches to and anchorages to the southward of Corner Inlet, have also been furnished by the operations of the Beagle during this important survey. Much labour and personal exertion have been bestowed upon this work, and too much praise cannot be given to those who have been prominent therein. It may be, however, necessary to say, that it was commenced by Captain Wickham, and completed by Captain Stokes.

This, however, would not have been the last work which the Beagle would have performed for the colony, but for obstacles which unexpectedly presented themselves, and prevented Captain Stokes from making a survey of the neighbouring coasts of Port Jackson. The necessity for a chart of the coasts is very urgent, from discrepancies which have been found to exist in the only chart now in use; and the principal materials for it have been from time to time prepared as the Beagle passed up and down the coast. It is to be lamented that this desirable matter could not have been accomplished.

It is unnecessary to follow the Beagle with more detail through her various movements upon the long and tedious service upon which she has been employed. Suffice to say, that the fruit of her voyage has been of the greatest importance to the navigation of the coasts, which will be amply proved when the charts of her voyage, particularly that of Bass's Straits, are published, and placed within the reach of navigators, by whom alone, from the unpretending manner in which the work has been performed, it can be estimated as it deserves.

Mining in Spain—A Romance of the Mines.

To the Editor of the Mining Journal.

Sir,—In my second letter I gave you a brief account of the situation of the Sierra Almagrera, and also traced the progress made by the miners in that quarter conveying to you, at the same time, some idea of the adit opening, in order to carry off the water. Since then, I have received a mass of interesting information relating to that extraordinary metalliferous mountain—after Almaden, certainly the greatest mineral curiosity in Spain. Among the papers before me is a plan, 22 inches by 16, of the demarcations of the mines situated on that part of it called Barranco Jaroso, together with the contiguous ones, which plan was copied from the original, designed by orders of Don M. A. Heredia, and beautifully lithographed, at Malaga, by Antonia Maqueda.

The Barranco Jaroso, I now beg leave to add, is a broken ridge of the sierra, extending from north to south to the length of about 1640 varas (Spanish yards), on a width of 800, and almost an entire mass of argentiferous lead. On the plan, each *pertinencia*, or sett, is marked, with the name in the centre; and, having

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* It may be within the recollection of our readers, the narrow escape Mr. Forsyth had on the west coast of Van Diemen's Land, in the depth of winter having coasted a steep rocky shore, for nearly ninety miles, in a crowded open boat. —(Ed. H. A.)

carefully counted the number, I find it reaches as high as ninety-eight, including a few on the sides. So eager, indeed, were people to open mines on this locality, that there is scarcely a bit of ground left unoccupied. The whole, one would almost think, was the work of magic. Not half a dozen years ago this spot was a wild and dreary waste, trodden only by the hunter's or shepherd's foot; now it is a scene of bustle, covered with bounds, traced into roads, crowded with labourers, studded with buildings, nine smelting-houses built upon it, and an adit 2200 yards long, level with the sea, and mostly roofed, fast advancing towards completion. Having said thus much in the way of introduction, I will sketch for you the manner in which the riches of this second Potosi were discovered. It is a real romance of the mines.

An obscure individual, named Valentin, by trade a spinner, at the time when the rage for mining commenced in Spain, fancied, from the extraordinary appearance of some of the clefts and surface of the Jaroso ridge, that it must contain ore of some kind or other. Tired of a sedentary life, and thinking that he was born to be rich, Valentin gave up his spinning wheel, and, without saying anything to his neighbours, sold his stock, left the little town of Cuevas, where he resided, and, staff in hand, bent his way to the Sierra Almagrera, which he carefully perambulated in several directions. In the course of his walks, he made an acquaintance with certain shepherds, who, during one part of the year, fed their flocks upon the contiguous hills, and, under pretext of seeking for medicinal plants, he obtained some valuable information from them, suited to his views. After various researches, he at length fixed on the Barranco Jaroso, and thither secretly conveyed a pick-axe and a spade, setting to work alone and unobserved; indeed, the spot chosen for his experiments was so secluded, that no human being ever approached it. There he laboured all day; at night carrying home with him, hidden in a bag, the heaviest lumps he could find, or those which emitted most metallic lustre—the only criterion whereby he estimated their worth. Having in this way collected a small stock, he procured a mule, and took it to Granada, where he met with a ready sale, and a promise to purchase another parcel, if brought, but without being able to discover more of the properties of the ore than that it was lead.—Again Valentin went to work, and made up a second load, which he carried to Cordova, thinking that there he should be more successful as regarded the quality. He soon found a purchaser for the contents of his panniers; and, after delivery, an offer was made to contract for a constant supply; but still all he could learn was, that the ore had a very fair proportion of lead. Valentin, however, noticed that the purchaser in both towns, which he alternately visited several times, were eager to have his ware, and reproached him for not coming oftener.

This little traffic Valentin continued several months, unsuspected by any of his neighbours, when, at length—convinced that he had in reality discovered the treasure which he was in search of, but not possessing himself the means to commence workings—after various consultations with his pillow, he called upon Don Miguel Soler, a plain and respectable inhabitant of Cuevas, to whom he revealed the encouraging nature of his prospects, and prevailed upon him to visit the sierra together under a bond of secrecy. The trip was made, the surface appearances deemed favourable, and eagerly to work went Valentin and Soler, neither of them, however, having the least knowledge or experience in the new branch of industry upon which they were about to risk their little all. Enthusiastic, and encouraged by anticipations of future affluence, they began by digging experimental pits, without anything like order—disdaining, as it were, to solicit the aid of professional skill, fearful, no doubt, of their secret being divulged—eventually fixing upon that particular spot of the Jaroso ridge where the Virgin del Carmen known also by the name of the Soler Mine, is now situated; and there their great effort was made.

Led on by the hopes of soon seeing a small vein or string of ore, which presented itself with remarkable promise near the surface, thicken and expand, these persevering adventurers continued digging and delving for a period of more than four years, without coming to the expected *bonanza*, or "God-send," in the course of which time they expended their little fortunes, more particularly Valentin, the sum total of whose property did not exceed 25,000 rials (260*l.*) when he commenced—so precarious and fluctuating is the mining pursuit. Such had been the unfortunate result of their ardour and perseverance, after pushing their economy and caution so far that they had not even incurred the expense, comparatively trifling as it was, of giving in a *denuncio*, or specified notice of the spot selected by them for mining—which, when registered on the inspector's books, is the first step towards obtaining legal possession, as it prevents all interference by other parties within the bounds described.

At this crisis of the affair, poor Valentin, broken-hearted, and completely worn out with labour and watchings, departed this life, leaving his true and faithful companion as the only depository of his secret. Senor Soler, however, possessing a strong mind, and, at the same time, convinced that, although so far unsuccessful, the appearances which he had so frequently seen warranted all that had been done, and even encouraged further efforts, far from dismayed, determined to go to work afresh, if possible, on a larger scale. Not having the necessary means within his own reach, he hit upon the expedient of calling in half a dozen friends and neighbours, some of whom lived at Vera*, and upon whose discretion he could rely. By exhibiting to them specimens of what he and his comrade had dug out, and raising their expectations, he at length prevailed upon them to enter into an association with him, and club together a small sum, for the purpose of making a final effort to secure the prize, which, he assured them, was at hand, likely to crown all their labours, and for the attainment of which he recapitulated the sacrifices made by himself and Valentin. Their assent obtained, the new company resumed workings, but, being all persons totally unacquainted with underground operations, and still apprehending the consequences of calling in professional advice, the second fund subscribed soon became exhausted, without having produced any tangible result, and the whole necessarily was suspended. More provident than Valentin, the new company, however, had the precaution to comply with the requisite formalities in the inspector's office, and the mine chosen had been regularly denounced, and allotted as a *pertenancia*, or sett. At this juncture, a person of the name of Julian made his appearance at Vera—a bold and enterprising man, slightly initiated in the secrets of mining, a pursuit to which he described himself as most warmly attached. As a bar had already been put to interference with the property registered, and to which bounds had also been affixed, after a consultation among themselves, one of the shareholders called upon him, exhibited some of their samples of ore, and asked his advice. Senor Julian seemed agreeably surprised at the metallic lustre and weight of the lumps of ore displayed, as well as with the confidence reposed in him, and, after calling in the aid of his magnifyer, and using a few of the simplest tests, he rose up from the table in a perfect extacy, and, wrapping his cloak mysteriously round him, declared that he had never seen anything so rich in the course of his study and experience, fervently congratulating the fortunate finders of so valuable a treasure on their good luck. Then, for the first time, they heard that the ore contained a good proportion of silver, and this assurance carried with it the more weight, in

* Cuevas (Caves), where Valentin resided, is a little town, within the province of Granada and district of Baza, situated on the confines of Murcia. It contains about 8000 inhabitants, most of whom formerly earned a miserable livelihood by collecting barilla, making *esparto*, or coarse grass mats, and fishing. In the above number those of five adjacent and dependent villages are included. The rivulet Almanzor flows round the town, helping to fertilise the neighbouring, or otherwise sterile, valley. The town derives its name from a number of deep and curious caverns close to it, supposed to have been dug by the Moors in search of minerals. It is generally called Cuevas de Vera. The latter is a small city, two short leagues distant, where although several families, in good circumstances, have always resided, the major part of the inhabitants about 9000 in number lived as it were, from hand to mouth. Vera has one *anejo*, or large village, attached to it, called Carrucha.—The situation is favourable, standing near the sea, but the port has only water enough for coasters, although susceptible of improvement. Near are the ruins of the ancient city of Urci, mentioned in Roman history—the mouldering vestiges of which denote the grandeur that place had once attained. On the declivity of Cavezo del Espiritu Santo, a projecting ridge, overlooking Vera, may be still seen the ruins of the original city of the same name, destroyed by an earthquake in the fifteenth century when the inhabitants determ[illegible] remove from what they almost considered a volcanic region, and, appro[illegible] coast, selected the present site—at first building huts, and afterward[illegible]down thither the remaining materials from their old abodes. With the [illegible]pects which the inhabitants have before them, in all likelihood this p[illegible]ise into importance. Its late deserted port is already frequented by such [illegible]els as can gain admission. In the neighbourhood are several ranges of hills, singular in their formation and character—strongly marked with mineral properties; among the most striking of which is the Sierra Almagrero. Towards the south also rises the Sierra de Cabrera, a metalliferous ridge, abounding in lead, ochre, and iron. Vierra is situated twenty-one leagues from the city of Murcia.

consequence of Senor Julian's eager entreaties immediately to be conducted to the spot where it was dug. Accordingly, the next day, accompanied by D. Diego Gonzalez and D. Bartolome de Caro, both of Vera, Senor Julian proceeded to the Barranco Jaroso, and, reaching the spot where the Carmen sett had been traced out, he descended the main pit (if such it could be called), examined the ground, and was not long in declaring it as his opinion, that they had met with a branch, which had separated from the lode sought for, but would inevitably unite with it again as they proceeded deeper when they would reach a deposit of galena, or argentiferous lead, capable, not only of rewarding them for their past sacrifices and disappointments, but also making the fortunes of every party concerned in the enterprise. Wound up to the highest pitch of expectation, the little exploring party returned to Vera, where Senor Julian was very prudently sounded, on the score of expenses. So well satisfied were the two gentlemen above named, with his opinion and subsequent report on the prospective cost, that they determined between themselves to have the little company revived, and that the original shareholders should each furnish an additional sum of 1500 rials (15*l.* 13s.), with which purse, they had been assured, the great work might be accomplished. These preliminaries settled, Senor Julian was dispatched to Cuevas, to confer with D. Miguel Soler, not the original, but the second, projector, and, through poor Valentin's death, now the leading man in the concern, and who was readily convinced, by Senor Julian's arguments, that it would be to his interest, and that of his partners in the town, to make the further sacrifice required. Three parties were in this way secured, but the execution of the project was still delayed—in fact, it nearly failed through the difficulties experienced by the other associates in making up the quota assigned to each.

At length the new stock created, amounting to a sum equal to 93*l.* 18s., was paid up, and a seventh share allotted to Senor Julian, who was appointed to direct the works, with a salary of 10 rials (2s.) per day. The operations were now, for the third time, resumed, and conducted with judgment and asssiduity. This, on all hands, is acknowledged; but, so strange was the fatality which seemed to hang over the enterprise, that, after beating away, and actually finding, a leader, although at a shallow depth, a project was formed, and even an attempt made, to assassinate Senor Julian within the works, by some of the parties interested, who declared that he had deceived them, and that the ore dug out, instead of being silver, was nothing more than rubbishing iron. So great, indeed, was the prejudice at first entertained against it, that no purchaser could be found, and I have already recorded the fact, that Senor Heredia, the extensive smelter, contracted for a large supply of the first Sierra Almagrera ore at 5 rials per quintal, whereby he laid the foundation of the large fortune which he has since amassed. So great was the depression at one time prevailing in reference to the Virgin del Cermen adventure, and so general the belief that no saint in Heaven patronised the scheme, that some of the shares were actually sold for 2000 (20*l.* 16s.) and 3000 rials (31*l.* 5s.) The other original shareholders, however, not quite so hasty, sent samples of the ore, on their own account, to smelting-furnaces at Adra and other places, where it was cupelled, each receiving as favourable a report of the produce as the most sanguine could have anticipated. To crown the good luck of the persevering few, who only commenced their labours in January, 1839, on the 24th of the following April the promised lode was discovered, at a depth of sixteen feet, when, three days afterwards, three more companies were formed, and the ore rose from 5 to 40 rials per quintal. I have already told you, in my second letter, above quoted, after this fortunate event, not one of the Carmen people would sell a share, or a particle of one, at any price, and that a thirteenth of the Observacion, the second mine registered there, could not be had for 60,000 dollars. Never were so many large fortunes made in one day.

It is now five years since the workings on the Jaroso ridge commenced, and in no one of the mines opened there do the excavations yet exceed 146 varas in depth. At the commencement of last July the Observacion had only gone as low as 136, but spacious galleries had been formed in it, some suppor[illegible] stone-work. This mine has come into great favour, owing to a promi[illegible]ery of gold, in addition* to the other metals. The whole neighbou[illegible] fact, turned into miners, as may readily be conceived from the num[illegible] delineated on the map. The two little towns of Cuevas and Vera, no[illegible] in a miserable plight, have acquired a new existence, and property in [illegible]pled in value. As an enterprise for the benefit of the former, the municipal authorities have taken one of the mines, called San Antonio and San Miguel, and placed it under the charge of a German engineer, name Docorn. The quintal of Almagrera ore yields 20 to 25 per cent. of lead, and the latter from 20 to 28 oz. of silver per

100 lbs. I have before informed you, that in four years the Carmen Company raised 1,500,000 arrobas of ore; in three years the Observacion 1,100,000 ditto; in two years the Esperanza 707,000 ditto; and in one year the Estrella 80,000 ditto. The quantity extracted from all the mines, at the present advanced period, is enormous, and the owners rely upon a continuity. The works of the main adit, of which I also gave you a short notice in my second letter, are carrying on with [illegible], and fast advancing towards completion. The magnitude of the enterprise, and the readiness with which those who will be eventually benefitted by it have subscribed funds to pay the expenses, are the best proofs of the value attached to the mining locality above described. Several new smelting works are also in the course of construction there. Curious as was the discovery of the mineral ridge of Potosi, and great in its consequences, the owners of setts on the Jaroso ridge nevertheless consider themselves almost as fortunate as the adventurous men who accompanied Pizarro to Peru. W. W.

London, August 24.

LETTER FROM J. P. GASSIOT, ESQ., F. R. S., &c., CONTAINING "A DESCRIPTION OF AN INSTRUMENT CONSTRUCTED FOR THE PURPOSE OF MEASURING THE RESISTANCE OF WIRES INTERPOSED IN THE CIRCUIT, AND THE ELECTRO MAGNETIC POWER OF DIFFERENT BATTERIES."

(To the Editor of the Electrical Magazine.)

MY DEAR SIR,—The accompanying drawings, with a few words of description, will explain to your readers the structure of an instrument which has been made under my directions, and whose action is to register by a dial-plate the number of times contact is broken under the varied circumstances of different electromotors and modified resistances to which it can be subjected. The base of the instrument is a wooden stand, seven inches in diameter; two short brass columns support the dial and its attendant wheels and pinions, as seen in the drawing. The dial possesses three indices, one pointing out the units, another the tens, and the third the hundreds. Two taller columns sustain the wheel visible at the back in Fig. 1, (Plate 32) and constitute parts of the connecting series, which will be better understood by reference to Fig. 2: *a*, a binding screw to connect with one end of the battery: *A*, a brass column, in metallic connection with *a*; *b*, a disc, partly metal, partly ivory, by which the circuit is alternately completed and cut off, the metal portion being in metallic connexion with *A*; *c*, a binding screw holding a spring, which presses on the edge of the disc *b*; *C*, a brass column in metallic connexion with the binding screw *c*; *d*, another binding screw, connected with the base of the column *C*, and containing one end of the wire of the electro-magnet *D*; *e*, a binding screw, containing the other end of the wire, and in metallic connexion with *f*, which forms connection with the other end of the battery. *E*, the soft iron keeper of the electro-magnet having a hinge at one end, and raising or depressing the perpendicular beam at the other. This beam, by means of a crank, communicates motion to the large wheel, the number of the revolutions of which, being equivalent to the alternations of attraction and cessation, are registered on the dial. The eye may trace the circuit more readily by following the dotted lines, which commence at *a*, and terminate at *f*.

The electro-magnets, of one of which Fig. 3 is a sketch, are five in number: their construction is as follows:—

No. 1 magnet, wound with a continuous coil of 16 ft. 2 in. No. 20 copper wire.
No. 2. " with 3 strands each 5 ft. 2 in. No. 20 copper wire.
No. 3. " wound with a continuous coil 4 ft. 10. in. No. 20 copper wire.
No. 4. " " 16 ft. 2 in. No. 20 copper wire.
No. 5. " " 3 ft. No. 14 copper wire.

No. 4. magnet made of iron wire.—No. 1, 2, 3 and 5, of soft iron from the same bar, each magnet about one inch long.—In illustration of the action of the instrument the following experiments may be taken:—

Experiments with No. 1 Magnet—Smee's Battery.

1 cell	.. no action			
2 "	.. 550	—With a resistance of 15 feet No. 20 copper wire, 195 revolutions per minute.		
3 "	.. 800	530 "	"	
2 "	310	15 feet, as above, no action.		*With No. 2 Magnet.*
3 "	630			

1 cell . . 920—15 feet wire, 520 } *No. 1 Magnet—Grove's Battery.*
2 " . — " 1120 }

From the preceding experiments, it would appear that it required two cells of Smee's arrangement to obtain 550 revolutions per minute; and three cells, 800. While, with one cell of Grove's, 920 revolutions were obtained. That, if 15 feet of No. 20 copper wire were introduced in the circuit, the action of Sm[illegible] cells was reduced from 550 to 195; and three cells, from 800 to 530; [illegible] same resistance introduced in the circuit of one of Grove's the action was r[illegible] from 920 to 520.

I am my, dear sir, yours very truly.

Clapham Common, June 20th, 1843. J. P. Gassiot,

CAPTAIN SMITH'S LIFE-BOAT.

There is, as in every thing that is useful and good, the utmost simplicity in this invention. It appears that Captain Smith, R.N., late commander of the "Excellent" gun-ship at Portsmouth, one day observed that there was room upon the paddle-box over the wheels of a steam boat, where, without the slightest impediment to action, and without at all encumbering the vessel, a boat might be made to rest; and, in addition to its good situation on board, it could, with the greatest facility, and without disturbing any of the arrangements that might be going forward, be dropped upon the surface of the sea, even in the midst of a storm. The experiment was, accordingly, made, and has been very successful, as is attested in a letter from the Secretary to the Royal Mail Steam Packet Company. It is therein stated, that in the loss of the large steamer, the "Solway," invaluable service was rendered by one of Captain Smith's paddlebox boats, "which, in a few minutes after the ship struck, was thrown into the water so hastily, owing to the alarm and confusion, that she was filled with water up to her thwarts, yet received above fifty men, women, and children, and towed by one of the cutters, carried the whole safely back to Corunna, a distance of twenty miles, in a dark night, with a considerable sea on. If time had permitted to get the other paddle-box boat over before her pinnace was swamped, it is certain that every one of the passengers and crew might have escaped, in the same manner that two of these paddle-box boats alone rescued the whole crew of the 'Isis,' amounting to above 100 persons during a gale of wind and a heavy sea."

The engraving [Figs. 4 & 5, Plate 32] illustrates the extreme simplicity of the invention; the position of the boat upon the paddle-box is shown in the first cut; and in the second is seen the facility with which it may be disengaged from its situation, and lowered to the sea. *Mag. of Sci.*

OSLER'S SELF-REGISTERING ANEMOMETER AND RAIN-GAUGE.

Although the Anemometer* was invented nearly a century since, it is only of late years that it has been constructed with sufficient nicety to insure very accurate results. Professor Whewell deserves foremost rank among the recent improvers of this instrument; and machines constructed upon the principle suggested by the Professor were exhibited at the meetings of the British Association at Dublin, Bristol, and Liverpool. In his Anemometer, a small set of windmill vanes, somewhat like the ventilators placed in our windows, is presented to the wind by a common vane, let the direction of the wind blow how it may; the aerial current, as it passes, sets these vanes into rapid motion, and a train of wheels and pinions reduces the motion, which is thence communicated to a pencil traversing vertically and pressing against an upright cylinder, which forms the support of the cylinder; so that 10,000 revolutions of the fly only cause the pencil to descend the 1-20th of an inch. Anemometers on this principle have been erected at the Cambridge Observatory, and at the house of the Cambridge Philosophical Society; by Professor Forbes and Mr. Rankin, at Edinburgh; and by Mr. Snow Harris and Mr. Southwood, at Plymouth.

The Anemometer invented by Mr. A. Follett Osler, of Birmingham, for the Philosophical Institution of that town, has been materially improved by Mr. Newman, of Regent Street; and the instrument with these improvements, as represented (Plate 31,) may be seen in the Gallery of the Great Hall of the Poly-

* From the Greek language, signifying Wind-measure: an instrument for measuring the force of the wind, by finding what mechanical effect the wind to be measured will produce on the apparatus.

technic Institution in Regent Street. This machine consists of five distinct parts :—

1. The Vane, to indicate the direction of the wind.—2. The Pressure-plate, to indicate the force of the wind.—3. The Registering Table, upon which the direction and force of the wind, and the quantity of rain, are registered.—4. The Clock, whose action, combined with that of other parts of the instrument, carries forward the panel of the registering table.—5. The Rain-gauge, to indicate the quantity of rain in a given area.

The vane S to indicate the direction of the wind is erected 6 or 8 feet above the highest portion of the building. At the lower end of the tube A A, (see fig.) is a small pinion, B B, working in a rack which slides backwards and forwards as the wind moves the vane. To this rack, a pencil C is attached, which marks the direction of the wind on a paper D D, marked with the cardinal points, and so adjusted as to progress at the rate of $\frac{1}{2}$ an inch per hour, by means of a clock. (See engraving.)

The pressure-plate E, for ascertaining the force of the wind, is 1 foot square, placed immediately beneath, and at right angles to the vane ; it is supported by light bars, running horizontally on friction rollers, and communicating with spiral springs, so that the plate, when affected by the pressure of the wind, acts upon them, and they transfer the amount of such action to a copper chain passing over the bottom roller ; a light copper wire is connected to this chain, and it passes down the centre of the standard tube to a pencil P below, which thus registers the force of the wind upon the above mentioned paper.

The rain-funnel U is an apparatus exposing an area of 200 square inches, and is fixed on the roof of the building, as fairly exposed as possible. The water collected in it is conveyed by a tube through the roof down to the registering table, and into a glass vessel H, so adjusted and graduated as to indicate a $\frac{1}{4}$ of an inch of water for every 200 square inches of surface, *i.e.* 50 cubic inches. The rain-gauge is a glass vessel $3\frac{1}{2}$ inches in diameter, and $5\frac{1}{2}$ inches in the straight part of the body. Connected with this vessel is a radius bar M, of which a magnified view is given in the engraving, holding a pencil point. When the gauge is full, it discharges its contents by a modification of the syphon, made as follows :—

A glass-tube, open at both ends, is cemented into the bottom of the cylindrical part of the glass reservoir. Over this tube a large one, closed at the top, (like a small bell-glass), is placed. The smaller tube thus forms the longest leg, and the large tube the shortest leg of the syphon. This contrivance has a peculiar advantage over the common bent syphon ; for, as its tubes are both straight and of considerable size, they are not likely to be clogged by the rain-water, and are most easily cleaned by passing into them a copper wire, or a strip of cane or whalebone, having a bit of tow or sponge at the end.

The mode in which the syphon is brought into action is sufficiently simple :— the water having risen to the level of the top of the inner tube, drops over into the little copper tilt in the globe R beneath the reservoir ; this tilt is divided in half by a slip of copper, and placed upon an axis—not exactly balanced, but so that one end or other preponderates. The water then drops into the end of the tilt which happens to be uppermost, and when quite full it falls over, throwing the water into the pipe of the globe in which the tilt is placed. In this way, an imperfect vacuum is produced in the globe, quite sufficient to produce a draught in the small tube of the syphon, or the longest leg ; and the whole contents of the reservoir immediately run off into a glass vessel placed for their reception. The reservoir having been released from the water, certain weights L raise it to its original and proper height, and the radius bar takes the pencil back to the zero point.

The table on which the instrument records its observations is 5 feet long, and about 3 feet 6 inches wide, having a strip cut out of the centre, 15 inches wide, to admit the boards on which the papers are fixed. Each paper placed upon these boards is calculated to hold the observations of twenty-four hours ; two papers are always kept on the table, so that as one is moved forward by the clock, and the chain passing over the pullies TT, the other immediately succeeds, and thus a continuous registration is kept up. The most successful mode of registering is by means of a hard pencil-point, or style, made of "fusible metal," *i.e.* an alloy of eight parts of bismuth, five of lead, and three of tin. This pencil marks a clear, permanent, silvery line upon stout wove paper, roughened by dusting its surface over with finelypowdered plaster of Paris, then rubbing it lightly with a clean cloth, and lastly wiping off the powder as clean as possible ; for if too much powder be left on the paper, it will impede the traversing of the point, and prevent its marking.

Mag. of Sci.

METEOROLOGICAL TABLE, KEPT AT DINAPORE, JULY, 1843.

Days.	Moon's Changes.	Self registering Thermometer. Minimum.	Thermometer, in the shade. Sunrise.	9 A. M.	Noon.	3 P. M.	9 P. M.	Daily range of Thermometer.	Difference between wet and dry bulb Thermometer. 9 A. M.	3 P. M.	Winds. A. M.	P. M.	Rain in inches.	Remarks. Night.	A. M.	P. M.
1		76·5	77·4	80	82	82·3	81·8	5·8	2·5	3	E.	E.	0·79	Th. Storm.	Rain till 8 o'c.	Showers.
2		78	78·6	81·5	83·2	83·3	81·3	5·2	2·5	4	W.	E.	1·02	Showery.	Rain.	Ditto.
3		79	79·5	81·8	85·8	87·3	77	10·3	2	7	N.E. light.	N.E. airs.	0·13	Thunder.	Ditto.	Light Clouds.
4		78	79·5	84·5	82·7	81·9	79	6·7	4	2	E.	E. light.	0.81	Rain.	Light Cloud.	Thun. & rains.
5	☽	78·5	79 4	84·3	87	87·7	84	9·2	3·5	8	E.	E.	,,	Fine.	Ditto.	Cloudy.
6		81	81·5	85·6	87·5	88·5	83	7·5	3	7	E. light.	Ditto.	,,	Ditto.	Cloudy.	Ditto
7		76·5	78	83·7	81·4	83	82	7·2	3	3	E.	Ditto.	1·48	Ditto.	Rain.	Thun. cloudy.
8		79·4	80·2	83·4	87·6	88	84·8	8·6	2·5	7	Ditto.	Ditto.	,,	Ditto.	Cloudy.	Light Clouds.
9		80·8	81·5	86·4	82·6	87·3	84·5	6·5	5	6	Ditto.	Ditto.	1·21	Ditto.	Rain.	Showers.
10		81	81·7	,,	81·5	88	84·3	7	,,	5·5	Ditto.	Ditto.	2.46	Ditto.	Ditto.	Ditto.
11	○	81	81·6	85·3	87	87·8	84·5	6·8	4	6·5	Ditto.	Ditto.	,,	Ditto.	Cloudy.	Cloudy.
12		79·2	80·2	84·5	81·7	88·9	83·8	9·7	4·5	9.5	Ditto. strong.	Ditto.	0·04	Light rain.	Ditto.	Light Cloudy.
13		80·3	81	86	89	90·2	86·5	9·9	6	10	Ditto.	Ditto.	,,	Fine.	Light Clouds.	Ditto.
14		81·3	81·7	87·4	89·1	90·7	86·5	9.4	6·5	11·5	Ditto.	Ditto.	,,	Heavy dew.	Ditto.	Ditto.
15		81·8	82·2	86·3	88·5	89·6	86·5	7·8	5·5	9	Ditto.	Ditto.	,,	Fine.	Ditto.	Cloudy.
16		81·8	82.2	86·8	89	90·6	86·6	8·8	6.5	10	Ditto.	Ditto.	,,	Ditto.	Ditto.	Light Clouds.
17		80	80·5	85·2	86	89·6	86·6	9·6	5	9	Ditto. strong.	Ditto.	,,	Ditto.	Cloudy.	Ditto.
18	☾	81·2	82	86·7	86·9	88·6	84·6	7·4	5	5·5	Ditto.	Ditto.	0·21	Ditto.	Rain at 11 o'c.	Cloudy.
19		82·3	82·8	85·5	86·3	86·8	85·3	4·5	4	6	Ditto.	Ditto.	,,	Ditto.	Cloudy.	Ditto.
20		81·6	82·3	88·7	90·7	90	85·7	9·1	6	8	Ditto.	N.E.	,,	Dew.	Light Clouds.	Ditto.
21		81·4	82	87·4	90·2	91·7	84·3	10·3	7·5	12	Ditto.	E. strong	,,	Fine.	Ditto.	Ditto.
22		80·2	80·9	85·6	88·5	91	87·6	10·8	6.5	11	Ditto. strong.	Ditto. Ditto.	,,	Ditto.	Ditto.	Ditto.
23		81·6	82·3	87	89·6	84·4	87·6	8	6·5	9	Ditto.	E.	,,	Ditto.	Cloudy.	Light clouds.
24		82·4	83·2	87·8	90·4	91·8	83	9·4	6	11	Ditto.	Ditto. Ditto.	,,	Ditto.	Light Clouds.	Cloudy.
25		80·3	81·1	85·7	88·5	90·5	85·7	10·2	6·5	10	Ditto.	E. Ditto.	,,	Ditto.	Cloudy.	Ditto.
26		79·4	79·7	84·3	87·2	88·5	84·7	9·1	5	10	E.	Ditto.	0·04	Slight rain.	Ditto.	Ditto.
27	●	80·7	81·4	84·2	86·4	88·6	85·2	7·9	4·5	8	Ditto.	Ditto. squally.	,,	Fine.	Ditto.	Ditto.
28		81·6	82·2	84·3	89·7	91·5	,,	9·9	3·5	9	Ditto. strong.	Ditto.	0·06	Ditto.	Light rain.	Light rain.
29		81·3	81·8	87·3	87	86·5	85·8	6	6 5	5	E.	Ditto.	0.02	Ditto.	Cloudy.	Ditto.
30		80·4	81·3	85·8	88·4	84·6	82·3	8	7	3·5	E. squally.	Ditto.	0·13	Ditto.	Ditto.	Thun. clouds.
31		79·3	80	84·9	87·5	86·4	83	8·2	5	7	E. strong.	Ditto.	0·01	Ditto.	Ditto.	Cloudy.
Mean		80·2	80·9	85·2	86·6	88·1	84·2	8·2	4·9	7·5						

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THE

INDIA REVIEW.

AUGUST.] —o— [1843.

BIOGRAPHICAL SKETCHES.

General Paul Avitabile,

Late Governor of Peshawur.

(WITH PORTRAIT.)

We need not at this time assure our readers that it has been a subject of constant anxiety with us to obtain memoranda developing the career of persons whose destiny has called them to stations the duties of which embraced high political functions and results. This, however, from the scarcity that necessarily prevails in the annals of India, where but few can hope to attain positions conferring pre-eminent distinction, from attaching responsibilities, or from events that have brought into play all the energies of which humanity is suspectible, is a thing infinitely easier to desire than to achieve. It follows that there are long interregna between notice and notice where our Biographical Memoirs apply to men who have filled a lofty niche in the temple of Indian fame. Amongst ourselves it is difficult to make selections where the services, under circumstances such as ordinarily happen, present nothing of a very prominent character as it respects the progress of individual career, which, in the main run, varies but little as the business of the state rolls on upon unctuous and well furnished machinery. It is in periods of trouble only that we may expect to light on occurrences where fortune gives the opportunity that displays the genius of the man she favours. For example, the campaigns in Affghanistan produced abundant evidence of talent, firmness, conduct, to which, in reference to various individuals, the world would have remained a stranger, but for the chain of casualties which produced them. The means have been wanting to acquire any decided information—such as that upon which we could endite a biographical memoir—because access to the parties was impossible :—thay have not travelled our way, nor could we travel theirs. We need not tell our readers that circumlocutory intelligence rarely offers matter for reliance, or that things simple enough in themselves become distorted when seen through different media. One who relates may exaggerate from partiality ; another may detract from opposite feelings ; while a third may view what is to be told but very superficially, and hence, in reality, offer no just judgment at all. To those, of whom we have been speaking, we will hope to enjoy the advantage of making a personal solicitation in due time ; meanwhile it will be enough to say that the plan we have laid down as invariable, has been to seek information at the fountain head, to hunt after facts, and then to give our own unbiassed opinion on what the kindness and courtesy of the parties appealed to have placed at our disposal. In the present number we

fortunately have it in our power to submit to our friends a brief and interesting sketch of one whose life has been a life of enterprize, and who has become known, and being known, has become respected by many of our compatriots in this quarter of the globe. But for the Affghan war, years might have rolled away without affording an opportunity for dilating upon the career of General Paulo Avitabilé, whose assistance in a political point of view has laid the state under obligation, and in private, ensured the esteem and good will of every man who had the happiness of forming his acquaintance.

The generous, frank and manly disposition of the subject of our sketch had rendered the name of Avitabilé, a synonyme for most of those qualities which adorn our common nature. Zeal the most untiring in his public capacity—a zeal, too, entirely devoted to the interests of the British power, in the instance to which we have adverted,—hospitality the most boundless, in regard to the officers whom the current of war had placed within his reach,—these are the tokens whereby the name of this gallant soldier will be recognized in the history of the momentous times wherein it was his destiny to bear so conspicuous a part.

PAULO AVITABILE, was born on the 25th Oct., 1791, at Agerola, province of Salure and in the Neopolitan dominions. Having been educated in the Civil College of the place, he commenced his military life as a Subaltern in the Provincial Guard, after which he entered as a private into the first Regiment of the Imperial Artillery of France; a step, that, under existing rules, was unavoidable as an introduction. He quickly became 2nd Lieutenant in 1813, and as 1st Lieutenant in 1815, obtained the cross of the Legion of Honor, having served with distinction in several regiments until the Battle of Waterloo altered the whole destinies of the French empire. In January, 1817, taking the meridional course of France and Spain, he undertook an overland journey to Africa, reached Marseilles, and then proceeded to Constantinople. From the latter place he crossed the Black Sea to Trebizond and traversing Armenia arrived at Amberst, where he first took service under the Persian banner in the year 1818. He was immediately placed under the orders of Prince Muhummud Ali Mirza, Regent of Kirmanshaw, in which province he formed the Artillery and Infantry regiments of the service, and greatly distinguished himself in various engagements on the frontier, particularly against the Arabs and the Turks. In recompence of his conduct the order of the Lion and Sun was conferred upon him, and shortly afterwards the first class decoration of that of the two Lions and Crown; he was promoted to the colonelcy of the regiments he had formed, and remained with them till the death of Muhummud Ali Mirza, in 1826, when he requested his discharge and made good his progress to Lahore, where his services were instantly engaged by the Maha Rajah Runjeet Singh, who bestowed upon him the rank of colonel in his army. He was early nominated Governor of Wuzeerabad, a large province situated between the Ravi and Chenab, exercising for nine years his gubernatorial functions as Civil and Military Chief.

When Runjeet Singh achieved the conquest of Peshawar he selected Avitabilé as its supreme local authority, promoting him to the rank of General. At this place he remained until the 10th of April, 1843,

having witnessed the advance and final retirement of our armies concerned in the Affghan campaigns, with the events of which he became intimately connected by the indefatigable manner in which his assistance was rendered to the troops. The General divining, possibly, that distraction which arose from the death of Maha Rajah Runjeet, and the divided counsels, the ambitions and the intrigues to which that event gave rise, had adroitly contrived to pass the bulk of his great wealth into the Company's provinces under various pretexts which concealed his intention from the Lynx-eyed minister of the Punjabee empire. Having done this he went to Lahore and resided there till the 31st of August, when he succeeded in obtaining leave from the reigning Prince Shere Singh, to visit the British dominions, the ostensible plea being indisposition, the real one an anxiety to disentangle himself from the convulsions which he perceived were upon the eve of manifestation. Once across the Sutledge he was safe from all machinations, visited Simla, receiving the hearty acknowledgements of our military for the kindness he had displayed towards their brethren in arms, and then leisurely bent his way to Calcutta, whence he embarked on the 14th Nov. on board the *Bentinck*, for his native shore. Subjoined we have the pleasure to affix the different orders as translated from the Firmans bestowed upon Monsieur Avitabilé, in reward of services performed, by the several princes who employed him, together with complimentary addresses from the several officers, whose position best enabled them to bear testimony to the great and active share he took in promoting the objects of the British government during the changeful operations in Affghanistan.

Translation of the Royal Diploma accompanying the decorations of the order of the Lion and Sun, 2nd class, conferred by His Majesty the King of Persia on M. Paulo Avitabile, Superior Officer in the service of His Royal Highness Muhumud Ali Mirza.

In the name of God and of His Majesty.

To God the greatest and best belongs the Empire.

Since the victorious tribunal of Providence has distinguished our Majesty in granting us perpetual enjoyment of the earth we are anxious to fulfil our duty towards our Empire by a readiness to recompense the merits of all those who render it any service. To this end we load with the favours of our sacred benevolence and we manifest towards them our satisfaction by emblems of honour.

To confirm this truth we have the flower of noble Italians, the very excellent Monsieur P. Avitabilé, full of valour, honour, and magnanimity,—the chosen among his equals, who has had the honour to be employed in the service of this Empire.

The detail of the services which he has rendered to the country subject to our rule having been judged worthy of our clemency, we have agreed to the petition of Muhumud Ali Mirza, the luminous star in the heaven of our kingdom, our most blessed and well beloved son,

our Lieutenant charged with absolute power to the confines of the Turks, Arabia and Adjena. We have granted the above mentioned decoration of the Lion and the Sun of the 2nd class enriched with precious stones, in order to distinguish him among his compeers, and we have ennobled and rendered him great among all his equals. We manifest to him thereby the regard with which we honour him, and add to the eclat of his merits, in order that, engaged to serve always with zeal and devotion, he may have it at heart to merit more and more the expressions of our infinite benevolence. Therefore we command the most excellent and puissant Lords, companions of our greatness and glory, our well-beloved Ministers and supreme Viziers, the Secretaries of our sublime Deewan, and all Agents and Secretaries to insert in the registries of our sacred archives this Royal Diploma, the tenor of which is to be respected. Be it known that this Diploma emanated from us on the 29th of Ramidan 1235 at Tehran.

The seals of their excellencies Hajee Muhumud Mos Khan, 1st Minister; Abdoola Khan, trusted with the Government; Mirza Abdool Wahab, 1st Secretary of State; Mirza Freydown, 1st Comptroller of State; Mirza Muhumud Zekka, deputy Secretary; Mirza Sadyk, registrar of the Royal Archives.

Mirza Moughun. „ Muhumud Ali. „ Zachim. „ Zeinelabdine.	Comptrollers of Finance.
Mirza Ubdool Kurreem. „ Muhumud. „ Abdullat.	Secretaries.

Correct translation,

J. D'eMurat.

(*Chief interpreter to H. R. H. the*)

10th February, 1820. *Commander of the Lion and the Sun.*

No. 2. A similar document accompanies the decoration of the 1st class of the same order granted in the month of Shaban, 1237, by the reigning king of Persia, Futalé Shah.

No. 3. The correctness of the signatures to both documents attested by J. Roussean, formerly Consul General of Bagdad. Dated at Marseilles, 16th August, 1824; to which is appended the countersignature and seal of M. Flamin, agent at Marseilles of the Minister of Foreign Affairs.

Traduction du diplome qui accompagna la Decoration de l'ordre des Deux Lions et de la Couronne, de la première classe, accordée par S. A. R. Muhammed Huçam Mirza à Monsieur le Colonel Paule Avitabile.

(*Légende du sceau*)

Le Toyau de Son Eminence royale, Muhummed Hucam, 1837.

Comme le très eminent, très valeureux, et [illegible] intelligent Colonel M. Paul Avitabilé, l'etoil des chrestiens, a rendu des services importans

à notre cour, siège de la Victoire, en y deployant beacoup de bravoure, de zèle et de capacité, surtout depuis que de frequentes batailles et autres faits d'armes memorables, où il s'est particulièrement distingué, out eu lieu sur nos frontières ; services qui sont avérés et appreciés par nous ; nous nous empressons de temoigner aujourd'hui à cet officier superieur, d'une manière honorable pour lui, notre bonté et bienviellance et notre approbation dont il a su se rendre si digne. En consequence nous lui conferons la Decoration de première classe, enrichie de pierres precieuses, de l'ordre des deux Lions and de la Couronne ; decoration qui est l'endice du courage and de l'entrepidité et la marque du talente militaire ; voulant que ce signe glorieux soit en tous temps et lieux comme la preuve certaine de tout ce qu' il a fait d'utile pour nous, and qu'il serve ainsi à l'elever et à le distinguer parmí ses collègues et semblables... à ce fin prescrivons a tous nos grands fonctionnaires, Generaux and chefs de milice, d'avoir pour lui toutes sortes d'egards et d'attentions flatteuses ; de lui rendre les honneurs qu'il merite et les bons offices qui dependront d'eux. Ordonnons en outre, aux conservateurs de nos archives et aux tutélaires de notre chancellerie, d' inscrire le present diplome sur leurs regîtres et de tenir la main à l'execution de son contenu—Donné dans le mois de schaban, l'an mil deux cent trente trois.—

(Sceau du cashem des principaux Ministres de S. A. R.)

Pour traduction fidèle conforme à l' original à Narville 12 Aôut, 1824.

J. Bousseaux,

Consul Général de France à Bagdat ;

Vû a l'agence du Ministre pour des affaires etrangères.

Translation of a Diploma from Runjeet Singh.

Through the mercy of—

Shree Ukkal Pooruk Jee.

(*Signature and Seal in Hindee.*)

Whereas it becomes kings of high renown and magnificence, to confer honour and rank upon the servants attached to their Court, suited to their conduct and capacity and their devotion to the Public Interest, in order that, by raising them to rank and dignity, they may ensure the affection of their subjects, and promote zeal and industry in the performance of honourable service and public duty. The Chevalier General Ameenood Duolah Avitabilé Dilawar Jung Bahadoor, the bold, the intrepid, and the honest, one of the principal and confidential Ministers of my *Khalasajee* Court, who was a long time in the service of the Court of Persia, and owing to his deserving and highly creditable conduct was placed in high and responsible situations by that Court, in proof of which he holds a document from the court in question ; and as from the time he has entered my service, he has never been

wanting in zeal, industry and talents, and has always conducted himself to my entire satisfaction, I therefore hereby order that the Mootusuddies of my magnificent Court should draw out a splendid *Furman* in the name of the General aforenamed in the world—subduing style, setting forth his gratitude and entire devotion to my interest, and the high services he has rendered the *Khalasajee* state, so that among his equals he might be distinguished. Let it therefore be known to my princely children, and the eminent Nobles of my state, and to all other authorities of my Dominions, that as from the time the General aforenamed has entered my service up to the present day, both in his military capacity and as Governor, I have never had any occasion to find fault with him ; on the contrary, throughout his useful and active career I have always had occasion to be satisfied with the manner in which he has all along conducted the duties of his high and responsible offices. I have in consequence in the due course of my princely benevolence, and kingly generosity, granted to him an august Diploma and the titles aforementioned in recognition of his eminent and useful services, and his entire devotion to my interest. It becomes the General aforenamed to look upon these favours conferred on him as gracious acts of my sovereignty and as precursors to further rank and dignity, and continue to increase daily his zeal and attachment to my Court.

Dated at Rotas 15th Jeth, 1894—accordingly to the Sumbut Era.

Examined.

I. W. O.

TRANSLATION OF A DEED GRANTED BY THE LAHORE GOVERNMENT TO GENERAL AVITABILE.

It is ever an attribute of great and magnanimous Kings, and of powerful and eminent Potentates, to confer, through considerations of kindness and the love of merit, their royal favors and imperial benevolence on the servants and attendants of their Heaven-like threshold according to their services and loyalty, and to exalt such faithful subjects, however humble, to the highest degree of honor and credit in order that royal favors so distributed by their exalted Majesty, and the devoted services of such faithful servants, being spread before the world like the resplendent sun, might reflect the rays of the royal munificence ; make their munificence of heart, and their high sense of merit appear in its fullest splendour ; render the hearts of the people grateful and subservient, and place under the bonds of obligation alike the gentry as the commonality. In this manner the courageous, brave, trusty, and devoted well wisher, Ameen-ooddowlah Chevalier General Avitabilé Dillaim-jung Behadoor, has during a long period, served the great Khalsa Government in matters of vast importance, as well in the administration of territories as in the command of victorious Armies, with praiseworthy prudence, and among the most conspicuous of his services, may be instanced especially the conduct of affairs at Peshawar (which has made the most indelible impression on the Khalsa Government) by the exercise of his extensive

acquirements with due regard to the dictates of humanity, and as a firm supporter of the Government.

We have therefore deemed it consistent with the principles of great rulers to distinguish and honor him by an especial mark of our royal favor, in the most acceptable grant of a medal commemorative of his peculiarly fortunate conduct of affairs entrusted to him, in order that it may serve amongst his compeers in every situation and in all places, as the renowned mark of high distinction bestowed upon him for unceasing services, devotion and loyalty ; and further that it may exalt him amongst the great and elevate him amongst his own class and equals.

The General therefore considering his own highest gift and the greatness of our bounty in conferring it to be the means of his honor should emulate the past by more and more displaying his zeal and energy in arranging all affairs and matters of state now entrusted to him, and in continued obedience, submission and gratitude evince himself the undeviating well wisher of the Khalsa Government and the anxious expectant of further higher favors.

True translation
R. M. HAMILTON.
Secy. to Gov. N. W. P.
Peshawur, 29th August, 1837.

From Shah Shooja.

IN THE NAME OF THE MOST MERCIFUL GOD !

As God has enlightened the eyes of the world by the lustre of my Government, and has suffused the sensorium of all mankind with the fragrance of the flowers of my standard, it is always my wish that people possessing benevolence and talents should receive the mark of my favour and *Furman.* As the eminent, dignified, noble, courageous, benevolent and distinguished soldier, General Avitabilé, Ameenood-Duwlah Dilawur-Jung-Bahadoor, a nobleman of Naples, has distinguished himself by generous actions and able conduct in my service, I have in consequence, in this blessed year of Oudecel, granted to him the 2nd grade of the Dooranree order, and have made him eminent among his equals. He should therefore invest himself with the dignity now conferred on him and add new decorations to his honour. The Moostuofeens of the Royal office are directed to keep a copy of this order in office. Dated in the month of Shaban in the year 1257 according to the Hijera.

Examined.
(Signed) FRED. OUSELEY.

MY DEAR SIR,

We cannot allow ourselves to set out from Cabool without expressing to you how very sensibly we feel the attentions and many civilities which you have shewn to us, during the last fortnight that we have

resided in Peshawur. The good feeling which has so long subsisted between the French officers of the Maharaja's service and those of the British Government is well known, and we hope you will not consider it presumptuous in our thus testifying, by the only means in our power, the obligations under which we feel, individually, to yourself for your kindness. At the same time that we express our best wishes for your prosperity and welfare, we assure you that we feel certain our countrymen both in India, and we may add, in Europe, will rejoice to have it in their power to return such good offices.

Believe us, My dear Sir,
With great truth,
Your's most faithfully and truly,
ALEX. BURNES, *Capt.*,
Bombay Army; on a mission to Cabool.
PERCIVAL B. LORD,
Asst. Secy. In charge of Mission.
JOHN WOOD, *Lieut. I. Navy.*
B. LEECH, *Engineers.*

A Monsieur Le Chevalier General Avitabilé &c. &c. &c. Peshawar.

Paneeput, Novembre, 1839.

MON GENERAL,

Les officiers Anglais me parlent d'une voix unanime de la bonté et de l' hospitalité avec lesquelles vous avez bien vulu les accueillir à Peshawar dans leur trajet du Cabul aux Indes, et je me fais un devoir et un plaisir de vous prier d'accepter les expressions de ma plus vive reconnoissance. Il m'est un sujet de regret que pendant mon sejour dans le voisinage du Punjab et qu' à mon visite à Lahore l'occasion de vons rencontrer nese m'es jamais presenti et que je ne connais vos excellentes qualites que par une reputation generale et bien acquise. Mais j appretie bien toute l'estime que je vous dois, et partant en cette occasion je vous prie les remercimens qui vous sont dus avec l'assurance de ma part des sentimens affectueux avec lesquels je suis

Votre serviteur obeissant,
(Signed) AUCKLAND.

Le General Avitabilé.

Camp Peishawur, 25th December, 1840.

MY DEAR GENERAL,

Having completed with so much facility the arrangements necessary to put the troops under my command again in movement in progress towards Cabool, I have now the pleasing task to offer my sincere acknowledgements for your exertions, and for the interest you have displayed in forwarding the views of the Indian Government by the able assistance you have rendered me in supplying the wants of my Brigade.

I cannot sufficiently express my sense of your kindness in favouring me with your valuable services, or the pleasure I now feel in recording my sentiments of the obligation conferred.

Your liberal hospitality to all the officers and myself will ever be a subject of pleasing recollection; I beg to offer you in their name sincere thanks for your flattering attentions and the kind reception we have been honoured with.

Believe me to remain,
My dear Chevalier,
Your faithful servant and sincere friend,
T. SHELTON, *Brigadier.*

To General Le Chevalier Avitabilé,
Governor of Peishawar.

Peshawar, 9th Nov., 1842.

MY DEAR GENERAL,

I cannot allow this second visit of mine to Peshawar to pass without expressing to you how sensible I am of the great assistance you have invariably given in all matters where the interests of the British Government have been concerned,—the aid you have afforded has been valuable during the whole time that I have commanded the troops here and in Affghanistan since the commencement of February last, and I am quite aware that you have been equally alive to our interests since the period when our troops first marched towards Affghanistan. I consider myself bound as a public officer to make this acknowledgment of your services in your official capacity.

Your hospitality and hearty welcome to your house of every British officer who has visited Peshawar is well known to all India, and I am sure that every officer duly appreciates your kindness; allow me therefore on my own behalf and theirs to return our warmest acknowledgments, wishing you health and happiness here and in your native country whenever you may return.

I remain,
My dear General,
Very sincerely yours,
GEO. POLLOCK,
Major General.

General Avitabilé, &c. &c. &c., Peshawar.

Peshawar, 11th November, 1842.

MY DEAR GENERAL AVITABILE,

I owe it to you, and it is a pleasure to me, to tender to you the expression of my warmest acknowledgment for the polite attention and truly liberal hospitality shewn by you to me and to the officers of my division since our arrival in the vicinity of Peshawar. Your cordial reception of us could not be otherwise than highly gratifying at any time, but now especially so after the toils and privations we have for many months been undergoing amidst a people whose every feeling and act were bitterly hostile to us. Be assured, my dear General, that you have secured to yourself the grateful recollection and esteem of the

British officers who, by their visit to these parts, have had an opportunity of witnessing and appreciating your kindness, and no one can entertain a higher sense of it than my dear General,

Your most sincere and obedient,
Humble servant,
JOHN McCASKILL,
General Avitabilé, Governor of Peshawar. *Major General.*

MY DEAR GENERAL,

I cannot leave Peshawar without expressing to you, though I feel it can only be in very inadequate terms, the high sense of gratitude entertained by every officer under my command, but more especially by myself, for your extreme kindness and boundless hospitality whereever we have chanced to come within their reach, and which have enabled us to appreciate by personal experience those rare qualities by which so many hundreds of our countrymen, on their way to and from Affghanistan, had been welcomed before us, to such an extent as to render the name of Avitabilé almost a synonyme for munificient hospitality throughout the British provinces of Hindustan.

It might perhaps appear presumptuous on my part to offer any opinion on the advantage which the British Government has derived from your having fortunately been the Governor of Peshawar during the late eventful times, had I not arrived here in command of the advance of the British forces, destined for Cabool, and remained for some weeks in that responsible situation, during a great part of which I enjoyed the pleasure of such daily intercourse with you, my dear General, as gave me an opportunity to judge how much our military operations, and the comfort of the British troops, were benefitted by the supreme authority that you held over the lawless and disorderly multitude among which we had arrived, and which required to keep them in subjection all that firmness, fortitude and temper with which you are so eminently endued, and when a co-operation of the Maharajah's troops was required by me in January last, I have witnessed with a lasting gratitude for your endeavours how arduous were your exertions, even when laid up on the bed of sickness, to procure it.

Accept now, my dear General, the assurance of my consideration and esteem, together with most heartfelt wishes for your health, prosperity, and safe return to your native country, and ever believe me to remain,

Very sincerely yours,
G. F. WILD, *Brigadier,*
late commanding the troops proceeding into Afghanistan.
Camp, near Peshawar, 12th November, 1842.
To General Chevalier Avitabilé, Governor of Peshawar.

Camp, 14th Nov., 1842.

MY DEAR GENERAL,

I have received your very kind present of sweetmeats and pickles, for which I feel myself very much obliged, and I have no doubt I shall find them very good and quite a treat on the long march before us. The officers of my Army already feel your great kindness to them and

will no doubt properly appreciate this additional and acceptable proof of it. Wishing you every happiness,

I remain,
My dear General,
Yours very truly,
General Avitabilé. W. NOTT.

Head quarters, Camp Goorsingunge,
Nov. 30th, 1843.

MY DEAR GENERAL,

Although I have solicited the Governor-General to convey to you my regret, still you must allow me to do so myself, that I had not the opportunity when you were passing through Cawnpoor, of assuring you of the grateful sense I entertain, and which I know to be universally entertained by the army which I have the honor to command, of your unvarying kindness and great hospitality when passing through the Punjab to our officers. Your unexpected arrival at and as unexpected departure from Cawnpoor, prevented Major General Grey and the officers of that station, paying you that respect and attention which your rank, your character, and your former courtesies required from them, and which they were most anxious to shew you.

I am but a guest at General Grey's, having left my camp and establishments some marches in the rear.

The moment Generals Grey and Thackwell heard of your arrival they proceeded to pay their respects, but found you had gone.

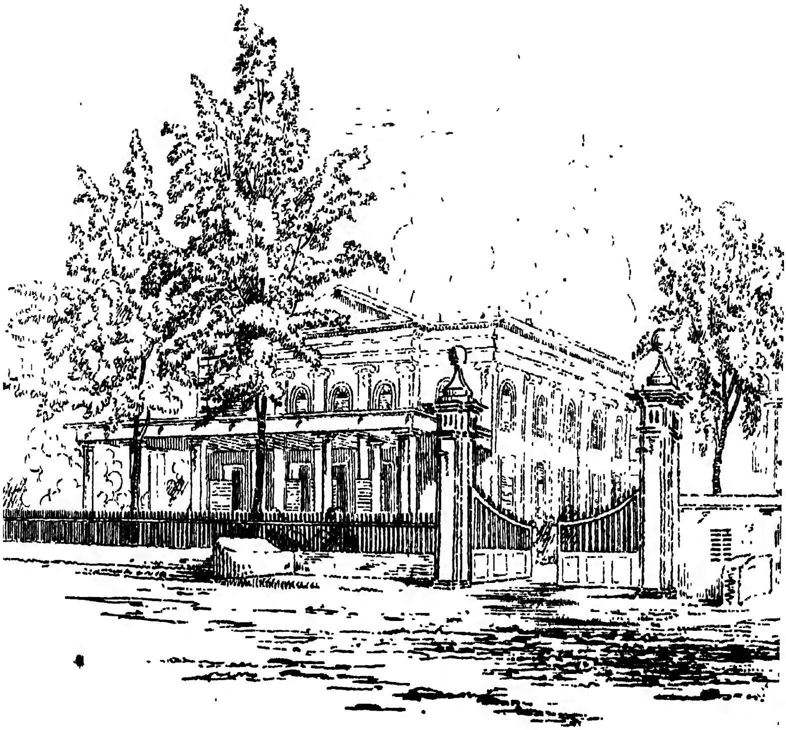
After this expression of my feelings I need hardly say how great satisfaction it would afford me should the current of events in our own father lands, enable me to express personally my estimation and respect. Wishing you health and happiness,

Believe me, my dear General,
Your's very faithfully,
H. GOUGH, *General.*
General Avitabilé. *Comr. in Chief in India.*

Having now gone briefly through the career of M. Avitabilé's public life, it only remains to add that he is, by disposition, as frank in his manner as decided in his conduct. His sway over the Sikhs was maintained with a firmness amounting to severity ; but it was the result of his conviction and he felt that his authority could be upheld by no other means ; and indeed in addressing a letter on the character of this people to the Governor General, he strongly insisted,—if ever his Lordship came in contact with them,—he would find it indispensable to a proper control to exercise upon them the whole rigor of the laws ; describing them, after so many years of experience, to be, without exception, the most faithless and turbulent race in existence. Of their moral conduct he held the most contemptible opinion ; of their courage he affirmed it to be but the excitement of the moment, never enduring, boastful in kind, and dependent entirely on the consciousness of superiority both in numbers and equipment. Their artillery he pronounced excellent, and he further believed that their national vanity would at any time produce a collision, but that a *single* one would suffice to cure it. He flatly declared kindness and courtesy would be thrown away, and placed before us one or two letters, from other Officers in

the service, confirmatory of the these views. That M. Avitabilé exacted obedience under the sternest enforcement of his power is beyond a question ; but, save in its rigor, we know not the justice of its application has been called in question, and what he did, he did upon principle grounded on his acquaintance of those with whom he had to deal. Runjeet, a man the calibre of whose mind put him centuries before his subjects, demi-barbarian as he still was, appreciated the conduct of his foreign officers, and turned a deaf ear to complaints against them ; and we doubt not that severity was, as M. Avitabilé described it, *mercy in the event* by preventing the continuation of excesses which he is assured nothing but the apprehension of instant and condign punishment could suppress.

In person, General Avitabilé is remarkable for the fine soldierly air of his carriage, and for the bronzed complexion of the veteran officer upon whom work, rather than *years*, has left its impression. Robust, capable of sustaining fatigue, inured to it from youth and wearing well in middle age, notwithstanding its invariable influence, he enjoys the prospect of a lengthened life among friends to whom he returns full of honors and happy in the abundance he possesses, offering an example of how much may be effected by resolution even where circumstances placed a man wide of the line on which his destiny originally started him. Had fortune, (giving full scope to the vigor of Lord Wellington's genius,) not terminated the career of Napoleon on the plains of Waterloo, there was every probability that Avitabilé would have fulfilled the bright promise of his earlier life, and acquired high distinction in the French armies,—the augury was in his favor, his gallantry paved the path to promotion, his actions secured applause and, in common with many of his countrymen, he had already reaped the first fruits of an apparently remunerative harvest, in scenes, and on fields, worthy of a brave man's toil and talent. Cut off from pristine hope, with nothing but his sabre and his unconquerable spirit to support him, he formed the hardy decision of seeking on lands to which he was an entire stranger,—stranger in language, manners, and habits, for the subsistence of which fate had deprived him in Europe. A soldier returns not readily to peaceful occupation unless he masters the means of successfully pursuing it. His practical education unfits him for sedentary labor, and he still looks to a military sphere of action as the only one suitable to his condition. Such was the sentiment of Avitabilé ; and with what ardor he wrought out his independence, with what sagacity he secured it, we have endeavoured to display in the short and imperfect memoir that we now offer to the public. We are men of peace ; beholding war as the strongest testimony of the evil influence that pervades the world, we deprecate it as the direst of all the curses entailed upon mankind. Yet, as war seems, in some sense, the condition of existence,—as animal prey upon animal and man upon all things,—we can understand and admire the lofty code by which the conduct of the civilized soldier is regulated : and however the continuance of animosity may still afflict the earth, and form the most copious theme for lamentation, we cannot refuse the tribute of our applause to that heroism which, spurning at adversity, produces in martial men an enterprize that no impediment can baffle, and no misfortune can check. Of this mental hardihood we produce General Paolo Avitabilé as a signal and a happy example.



ANNALS OF THE UNION CHAPEL.

We have in former numbers presented our readers with Annals or Records of some of the edifices which adorn the City of Palaces connected with the established Churches of England and Scotland. In this number we give a sketch and notice of one of the principal Chapels connected with the Missionary Societies in and around Calcutta.

The Union Chapel has now for nearly the last quarter century been a well known place of worship amongst us. It is the English Chapel connected with the London Missionary Society's mission in Calcutta: it is a simple, but elegant structure; it seats about 400 persons; its dimensions are 68 feet by 48 feet, with a commodious vestry 48 feet by 16½; it was built soon after the commencement of the Society's labours in this country, by a public fund, contributed to by Christians of different denominations. Bishop Heber, whose architectural taste all will admit, said that it was one of the simplest and chastest Christian buildings he had seen in India. The subscription was commenced in the year 1819; the Chapel was opened for Divine Worship in June, 1821. The Rev. H. Townley, through whose influence and exertions, in conjunction with the Rev. J. Keith, the funds were chiefly raised, preached

on the occasion from Zechariah iv. 17. The Rev. Messrs. Eustace. Carey, J. Lawson and J. Keith, engaged in the devotional exercises.

The Church and congregation had previously, through the kindness of the Masonic brethren, assembled for worship in the Freemason's Hall, in the Dhurhamtallah. When first opened, and for some time after, the pulpit services were conducted alternately by all the Missionaries of the Society. This interfering with their Missionary duties, it was deemed expedient to commit the preaching and pastoral labors to two of the brethren in connection with their missionary labours. Messrs. Townley and Keith were appointed the first pastors; this plan ultimately issued in the selection of one only, whose labours should be entirely and exclusively devoted to the pastoral office. The first pastor was the Rev. James Hill, whose commanding and pious eloquence is still fresh in the recollection of many who gladly heard the word from his lips. He was succeeded by the Rev. R. C. Mather, A. M., and he, on his removal to Mirzapore, upper India, was succeeded by the present pastor, the Rev. T. Boaz. Mr. Boaz took the oversight, January, 1835.

The minister of the Union Chapel, according to the deed of trust, must be a Missionary of the London Missionary Society, selected by the church and approved by his brethren. The building, together with the Pastor's house, is the property of the London Society, held in trust and are made over to the Church and congregation rent free, on the agreement that they shall be kept in good and substantial repair, and that the pastor be supported by his flock. This arrangement must, under the Divine blessing, prevent the possibility of erroneous sentiments ever being disseminated from the pulpit of the Union Chapel. The constitution of the church is *unsectarian;* it is neither Independent, Presbyterian, or Episcopalian—it is, as its name imparts, a *Union* Church, or place in which all true Christians can unite to worship a common Saviour without the sacrifice of conscientious scruples on minor matters of faith and practice. The peculiarities of no one section of the true Church have ever been set forth by its pastors in their ministration since its erection. The form of worship is simple, and as far as it well can be, is not only in accordance with what its founders believed to be the spirit, but the letter of God's word. It is in fact a practical illustration of the truly generous and Catholic principle on which the parent society was founded:—

"FUNDAMENTAL PRINCIPLE.

"As the union of Christians of various denominations, in carrying on this great work, is a most desirable object; so to prevent, if possible, any cause of future dissension, it is declared to be a *fundamental principle* of the Missionary Society, that its design is not to send Presbyterianism, Independency, Episcopacy, or any other form of Church order and government, (about which there may be difference of opinion among serious persons), but the glorious gospel of the blessed God to the heathen; and that it shall be left (as it ought to be left) to the minds of the persons whom God may call into the fellowship of his Son from among them, to assume for themselves such form of Church government as to them shall appear most agreeable to the word of God."

The accompanying extracts from the regulations adopted at the formation of the Church will show its actual constitution:—

"I.—*Respecting Doctrine.*

"That this Christian Church receive the Bible as the inspired word of God, and as the only standard of faith. That in their belief, it declares the Unity of God; that there are three persons in the Godhead, the Father, the Son, and the Holy Spirit; and that these are one divine Essence equal in power and glory. That God foresaw from all eternity, that man would fall, and that he, out of his free and sovereign grace, chose a certain number of the human race in Christ to be holy, and without blame before him in love; that God created man in righteousness and true holiness, with ability to keep his law; that man has violated the righteous law of his Creator, by which his whole soul is disordered with sin, and made liable to all the miseries of this life, to death itself, and to the pains of hell for ever. That Christ united the human nature to the divine, in order to make an atonement for sin. That man is justified by the imputed righteousness of Christ, regenerated and sanctified by the Holy Spirit, and is enabled to persevere in holiness; and that those who endure to the end, shall be saved.

"That a fuller account of the doctrines contained in the Bible, is well given in the Assembly's Catechism.

"II.—*Respecting Baptism and the Lord's Supper.*

"That it appears to be agreeable to the mind of Christ, that the ordinance of Baptism be administered once to believing adults and to their children, and that the Lord's Supper be administered repeatedly to all who love the Lord Jesus Christ in sincerity.

"III.—*Respecting Pastors and Elders or Deacons.*

"That one or more men apt to teach, and whose hearts are found peculiarly full of faith, and of the Holy Ghost, be appointed by the Church to the pastoral office, to take the oversight of the flock in the name of the Lord, and to supply their spiritual wants by expounding to them the word of God, by dispensing the ordinances of Baptism and the Lord's Supper, and by conversing with the members individually, to administer counsel, comfort, or reproof, as their cases may severally require. That one or more holy men, fearing God, and hating covetousness, be appointed to the office of Elder or Deacon, to manage the temporal affairs of the Church by providing for the Table of the Lord, the support of the Pastors, and the wants of the Poor.

"V.—*Concerning the Qualification of Members.*

"That the qualifications deemed peculiarly and indispensably necessary for the admission of any candidate into the Church, are an exclusive reliance upon the work of Christ for justification, an experimental knowledge of the work of the Holy Ghost as the author of sanctification, and a walk, both in private and public, agreeable to God's revealed will and commandments.

"That persons of whatever denomination desirous of occasional communion, be welcomed to the Lord's Table, upon previously intimating their wish to the Pastor, and the Church being satisfied of their piety.

"VI.—*Respecting Church Discipline.*

"That the will of Christ and the welfare of the Church both requiring purity of discipline, it is resolved, that if the painful occurrence should arise of any Member of the Church being found living in the parctice of sin, that admonition, suspension, and excommunication, be resorted to, as the case may require: that re-admission, can take place only upon satisfactory evidence of unfeigned repentance."

The Church is composed of Episcopalians, Presbyterians, Baptists, Independents, and some, who we have reason to believe, are attached to no sect,—but who love all who love the Lord Jesus, in sincerity and in truth, independent of their peculiar forms or creeds, and we sincerely pray it may ever be so. It is managed by a body of elders or deacons, and a committee of managers; the former attend to the religious, the latter to the secular affairs of the Church. Divine Service is conducted on the Morning and Evening of the Lord's Day;

in the Morning at 10, and in the Evening at 7, and on Wednesday Evening at 7 o'clock. The Lord's Supper is administered on the morning of the *second* Sabbath of every month, when Christians of every section of the Evangelical Church, in full communion with their own Churches, and holding the truth in righteousness, having previously consulted with the pastor, may unite in that commemorative ordinance, either as occasional communicants or stated members.

The interior of the Chapel contains many plain but affecting memorials of the brevity of human life devoted to the noblest and best causes —christian Missions. Tablets to the memory of the Rev. Messrs. Keith, Trawin, Piffard and deRodt, together with the following, affecting and instructive memorial, tell a sad tale as to the fearful nature of the climate in which these good men lived and died, and in which many are still permitted to labor and pray for the welfare of the people:—

To the Memory of the following Missionaries
of the
London Missionary Society,
Who having faithfully laboured in the service of Christ in this country,
Died
Whilst prosecuting their important work.

Nathaniel Forsyth, arrived in India in 1798,
Died Feb. 1816, aged 47 years.
Robert May, arrived in 1812, died August 12, 1818, aged 30.
J. D. Pearson, arrived in 1817, died October—, 1831, aged 41.
Robert Hampson, arrived in 1819, died September 21, 1820, aged 25.
Wm. Bankhead, arrived in 1822, died October —, 1822, aged 23.
Joseph Warden, arrived in 1822, died January 8, 1826, aged 25.
John Adam, arrived in 1828, died April 21, 1831, aged 27.
James Robertson, arrived in 1826, died June 15, 1833, aged 30.
Thomas Higgs, arrived in 1830, died December 3, 1832, aged 24.

"Now, Faith is the substance of things hoped for,
The evidence of things not seen ; for by it the elders
Obtained a good report. These all died in faith,
Not having received the promises,
But having seen them afar off,
And were persuaded of them, and embraced them,
And confessed that they were strangers."

THIS TABLET.
Is erected by Christians of different denominations as an expression of respect for the
Memory of Brethren
Who were esteemed worthy to labour and die in the
Missionary Field.

It is refreshing to ponder over the brief history and present condition of the Church of Christ assembling in the Union Chapel. To think of the many devoted Missionary brethren and pastors, who though of differing views on minor points, have zealously and unitedly laboured in word and doctrine, amongst the people for Christ's sake, but who are now with their Lord, and with the souls in glory of those whom they were the means of bringing to Christ. To survey the time since first the Missionaries of the London Society commenced their labors, and to think of the many who through their instrumentality have been turned

from darkness to light, and meetened for Heaven, in connection with the ordinances administered there, is very encouraging. The chapel has not been erected for nought; of this and that man it can be said he was born there,—the brethren have not labored in vain, for they have saved souls alive and hidden a multitude of sins. In the present state of the Church of Christ, rent and torn as it is by sects, and disturbed by the dissemination of poisonous errors, without attaching either to the place or ordinances any superiority over other churches, it is in our esteem refreshing to be able to point to one spot and say of it—

"Here names and sects, and parties fall."

In theory all peculiarities can be respected if substantially true; in practice they meet no immediate sanction, while no violation is offered to the tender conscience or tremulous disciple except it be found in the simplest forms of worship, and in the plainest exhibitions of Gospel truth.

ON OBSERVING IN ASTRONOMY.

To the Editor of the 'India Review.'

SIR,

In the hope of promoting the study of astronomy in this country, I send you a few precepts in a department of that subject which is the most generally inviting, and unfortunately the most beset with difficulties—that of observation. It is my intention to confine myself to the results of my own experience, not that it is ample enough to dispense with illustration from other sources, but that I see no reason for reprinting matter which must be found in some of the books that every beginner will find it necessary to acquire. If it were necessary to find excuses for troubling you, the first I should offer would be that practical astronomy has to a considerable extent a *local* character. Directions which will suit the situation of the neighbours of the Astronomer Royal will frequently be useless within the tropics, or at the Cape and Paramatta, and others which are applicable to the longitudes of Europe fail in exactness at Calcutta or Canton. And this is of the more consequence to us, since writers on astronomy preparing their works for the great body of their readers in Europe have not thought it worth while to swell the bulk of their volumes by giving specific directions for localities in which few are to be found who have occasion for the greatest exactness in reducing their observations. Elaborately to demonstrate this position at the very beginning of my paper would be preposterous: I shall merely illustrate it by the instance of that method of putting a transit telescope in the meridian which is always first given in books of Astronomy, that is to say, the method by the upper and lower transit of the pole star (α Ursæ Minoris). Of this it may be observed that it can be practiced in low northern latitudes only for a few days in the year, in consequence of the less duration of daylight in the winter months, to say nothing of the vapours on the horizon which so frequently obscure a star of the second or third magnitude. I do but glance at the difficulties of this method as the adept will see. The attention of many a practical astronomer has been first

directed to his pursuit by the accidental acquisition of a telescope quadrant or sextant. I think that the attention of Ferguson was first engaged by seeing a star in day-light from the bottom of a well. This cylindrical hollow acted as a telescope or as the plane tube of a sextant or quadrant. The event seems to have recurred, for the younger Herschel speaks of such a thing having happened to a contemporary. The learned reader will be reminded of the Egyptian approximation to the length of a degree. Now of these instruments I recommend the first chosen to be a quadrant—a common reflecting quadrant made of ebony with inlaid ivory arc for graduation. They may be bought as good as new, in Calcutta for 15 Rupees, and I am aware that inferior instruments are obtainable for still less. My reason for recommending the quadrant is, that when bought second hand it is cheap enough to allow you without much regret to spoil it in that tormenting which your first instrument will assuredly suffer. Every astronomer possessed of instruments who shews them to his friends is aware that there is in man a tendency to turn mill-headed screws—from curiosity, I suppose, to see what effect will be produced. That it is innate is proved by those manifesting it who may be supposed to be looking at one for the first time. Now this is a feeling which it requires a great deal of indulgence thoroughly to lull, and to secure this desirable end, I unhesitatingly recommend the purchase of a quadrant, which has plenty of these screws, to say nothing of those that are capstan headed. I have heard of an eminent astronomer who had all the screws in his instruments of the latter kind in order to foil strangers in their attempts to produce an effect *ex vi suâ*, by their own potentiality.

Having procured the quadrant, the learner must have a book explaining its adjustments, the method of using it, and the results that may be obtained from it. Most books describe the sextant and state that the description includes that of the quadrant, of which latter accordingly nothing is said. Norie's navigation is a good and very common book, free from this fault, easily borrowed, or if bought meeting with a ready sale when no longer required. It contains a number of useful tables, which it is desirable to possess in a collected form. For the mere text, it is only deserving of praise for the part on instruments and the examples. Rules are given without reasons, which latter however may be found by one who wishes to extend his studies, in Riddle's navigation, a more scientific work than the other. Mr. Riddle is an eminent teacher of Navigation and distinguished by great attainment in practical astronomy, but he does not write so well on Instruments as Norie, who was a teacher of Navigation and also a maker of the instruments used in it. I shall have occasion to speak of Lieutenant Raper's work on Navigation afterwards. It is of the highest merit.

The quadrant is used for taking altitudes where the observer does not care to be nearer the truth than 1′ (one minute) of arc, to which quantity the common ones read off. I now begin to speak technically, as I presume the reader has taken my advice and made himself acquainted with this the simplest of reflecting instruments, by reading the account of it in Norie. Some quadrants have telescopes and read off to 30″, (half a minute,) but should not be purchased. Being made of wood (ebony) and in parts which are joined together, dovetailed,

or perhaps rabbeted is the right word, they easily change their form, and the parts likewise become loose, especially in the month of July under the tropic of Cancer. Hence they can be used with the success expected where very rough determinations only are required. Another objection to the quadrant, except as an initiatory instrument, is that on land we generally measure altitudes of heavenly bodies with an artificial horizon, of which I can only say for the present that it is a contrivance for obtaining a more exact measure of an altitude than we can from the visible horizon, but requiring the means of measuring double the said altitude. Now as the quadrant only extends to about 90°, we can only measure by means of it and the artificial horizon an altitude of a little more than 45°. Hence the use of the quadrant is limited, and a telescope and high finish are thrown away on it. This is the place to observe that without a telescope or spectacles a short sighted person will never attain, with a quadrant, results so good as a long sighted or ordinary sighted person would. The reason is obvious. Celestial bodies being all distant are such as are seen indistinctly by myops, and this indistinctness of course exists in their images, which have to such persons three or four different boundaries. The consequence is that no exact contact or coincidence of images is to be observed. A pair of goggles, with a concave lens, deep or shallow according to the individuals exigency, placed before the right eye will completely remedy this. I once purchased both articles at Twentyman's for a Rupee.

It remains to point out the observations on which the quadrant *may* be used, premising that it is not special for any. It may be used for determining the latitude by the sun's meridian altitude taken on shore with an artificial horizon. With tables for reducing to the meridian observations on either side of it, and with a knowledge of the time at the place, the error ought to be brought to less then a minute of arc in a single day. Observations of several bright stars on the same evening, choosing them in pairs at nearly equal distances from the zenith, and on opposite sides of it, ought to bring out a result true to 15″. I am obliged to speak with less confidence on this point as I have never used the quadrant for determining latitude by stars, though I have for time. But with reference to instruments that make no pretensions to perfect accuracy it may be observed that in the hands of a diligent and careful observer the results of many observations agree more nearly than could be expected with the results of the best constructed. The main point is to make observations in pairs, such that the error of the instrument shall be eliminated in taking a mean of the results deduced from the observations. This is to be distinguished from taking several observations of the same object at the same time and place, the effect of which is only to diminish the error of observation, and not the error of the instrument. Another instance besides the one given above of the advantage of this course is the finding of the time by equal altitudes of the sun or a star before and after its passing the meridian. It is the equality only of the altitudes and not the absolute altitudes which the observer requires; so much so, that a quadrant or sextant without graduations would answer the purpose. This is the best method of finding the time with small instrumental means. The correction for change of declination

on the sun during the interval is best taken from the tables in "Wales on the longitude," a work which needs no recommendation from me, since Dr. Woollaston, in his Fasciculus Astronomicus, says that it ought to be in the hands of all persons interested in these subjects. The accuracy that may be expected from this observation depends on the nearness of the object to the prime vertical. If the sun be the object and on the prime vertical, the time ought not to be in error 5 seconds. The upper limb, lower limb, and centre afford three observations. The concave glass must not be forgotten by myops. I have obtained the time 2 seconds with the quadrant thus used. This is an observation peculiarly adapted to the use of observers within the tropics, when the sun's motion in altitude is so rapid. The quadrant, however, can only take the double angles which the artificial horizon gives when the angle itself is less than 47° ; and this restriction confines its use in finding latitudes also to stars of no greater altitude than that. The plane and silvered glasses should be good enough to secure a distinct image of the sun, and during the interval between the observations the instrument should be carefully protected from disturbing causes.

The quadrant is used in finding the variation of the compass, for which the works on nautical astronomy may be consulted. It may be used, and constantly is used, at sea in connexion with a chronometer, for determining the longitude by a comparison of the time at the place with the time shewn by the chronometer. But it is never used in determining the longitude by lunar distances. There is, however, one sort of lunar observation to which this instrument may be applied and with satisfactory results within the tropics at particular ages of the moon. I mean the method by the moon's altitude doubled of course by an artificial horizon. The conditions are that the moon should be on or very near the prime vertical, quick change of right ascension, accurate knowledge of the latitude and time, and from a transit noted in an observatory a future correction of the moons R. A., as predicted in the Nautical Almanac and presumed to be used in the computation. The moon should be observed at the same height on both sides of the meridian, and if each result be calculated separately, the instrumental error will be eliminated. Also when the moon's altitude has been observed, the instrument, remaining clamped, may be applied to observe the altitude of a known star at the same height as the moon was. Now as the height of the star can be computed with the greatest accuracy from a knowledge of the time and latitude, this will then shew error of the quadrant at that graduation and will of course give the moon's apparent altitude with all instrumental correctness. The only remaining error will be that of observation. The moon should not be below 30° or at any rate 24°, as refraction must be considered accurately determined. A very small error in altitude is of importance, because it produces 30 or 40 times that amount of error in the longitude. I am of opinion that from several observations on the same night corrected for the (possibly large) errors of the lunar tables in the Nautical Almanac, the longitude may be obtained by this method to 12' or even 10'. The computation may be found in Lalande's Astronomy, Raper's "Nautical Astronomy," and in a tract by Captain Crisp published at this presidency.

The celebrated Baron De Zach made much use of the quadrant,

distributing it over Germany with great liberality, and thus enabling many amateurs to take part in settling geographical positions. He attached great value to its use. See Lalande Bibliographie Astronomique. For some observations on the value of common instruments in industrious hands, see Penny Cyclopedia, articles "Barometer," "Lacaille," "Micrometer," "Circle." But the learner must not suppose that any thing is done by the quadrant which could not be done much better by the sextant and better still by one of the forms of the reflecting circle. He is supposed to buy the quadrant to practice upon, or at most, to afford him the amusement that astronomy offers to all who can command the price of the humblest instrument. After the owner shall have got as much out of the instrument as possible in this way, it will, if retained, serve as a useful finder and monitor of altitudes sought or supposed to be at hand, and which are to be taken with the more refined instruments.

I remain, Sir,

Your's faithfully,

A. B.

EXTRACTS FROM A STUDENT'S NOTE-BOOK

1. MENTAL PHILOSOPHY. "With perfect organs of vision (says Dr. Thomas Brown) and in the full light of day, it is not possible for us to look on a tree or a rock without perceiving it; but it is not more possible for us to form a conception of two trees without regarding this state of mind, simple though it truly is when absolutely considered, as virtually involving, or as equal to, two of those separate feelings, which constituted the conception of a single tree. On this mere feeling of virtual equivalence is founded all the demonstration of those sciences which claim the glory of being peculiarly demonstrative: our equations and proportions of abstract number and quantity involving continually this analytic valuation of notions as reciprocally proportional. Our conception of an angle of 45° is one state or affection of mind—one state of one simple indivisible substance, such too is our conception of a right angle. Our notion of four or eight is as much an affection of mind as our notion of a simple unit. But on reflecting on the separate states of mind which constitute these notions, we are impressed with certain relations which they seem to us reciprocally to bear, and we consider the angle of forty-five degrees as equal to half the angle of ninety degrees, and our notion of eight as involving or equal to two of four. If one state of mind, which constitutes the notion of a certain abstract number or quantity, had not been considered in this sort of virtual comprehensiveness, as bearing the relation of equality, or proportion to other states of mind, which constitute other abstract notions of the same species, mathematics would not merely have lost their certainty, but there could not in truth have been any such science as mathematics."

In this passage there seems to me to be much confusion, arising from the overlooking of the distinction between the "objective" and the "subjective." The doctor says truly enough that we consider an angle of $\frac{\pi}{4}$ as equal to half of $\frac{\pi}{2}$, but it is not true that we consider our *notion* of 8 to be double of our *notion* of 4. This is neither a *fact*, nor do we ever *consider* any such thing. The whole of Brown's lectures seem to be pervaded with an erroneous estimate of the value of the science of mind, grounded upon this very confusion. He seems to make no distinction between the powers of the mind, and an acquaintance with the

powers of the mind. Just as if a man could not see distinctly who did not know exactly the refracting power of the several humours of his eyes, or as if in order to educate a man for the profession of a stone-breaker, it were necessary that we should make him acquainted with the names of all the muscles that are brought into action in the course of his work, the exact leverage which they severally exert upon the bones, and all the theories regarding the part performed by the nerves in the production of motion. Even with this knowledge infused, Dr. Brown would not have given a man a certificate of qualification to exercise the art, trade and mystery of a road-mender. Oh no, he must first be taught the theory of pressure and impact.—Not *why* indeed (for then our roads must remain probably for ever in the state in which those in the Highlands were before General Wade went to them), but that it is a *fact* that by the stroke of his hammer he can produce as great an effect as would result from a dead pressure of several tons. But even yet he is not prepared to receive his diploma. He must be a mineralogist and geologist, for how could he break a piece of greenstone with the stroke that was intended to fracture a block of syenite ? A mistake on such a point would be fatal. How would our accomplished and scientific nappers eclipse the poor fellows, who, not knowing so much as that they have either muscles or nerves, or that their hammers act by impact and not by simple pressure, can of course produce no effect whatever upon substances which they know not how to classify. Yet strange it is that many stones have been broken besides those which the "faculty of nappers" have had under their treatment ; and we question whether our road-trustees will be easily brought to perceive the advantage of discharging all the quacks, and employing none but graduated *Petriclasts.*

I would not undervalue intellectual philosophy. It has its uses, and they are great. But when at one time it is said that no science can be properly studied by a man who is not a metaphysician, and when at another it is implied that in comparing two angles we compare not them but two states of our own mind,—then I can only say in reply, that many men have studied the various sciences successfully who have not been conversant with the science of mind,—and that if consciousness is to be the judge, I compare the angles themselves, and not the states of my mind when employed in contemplating the angles.

2. Knowledge and goodness. "A taste for science and literature, by refining the manners, renders men better and happier. These studies in general banish intrigue and ambition, and lead to virtue by the love of truth. The man of truth is the only honest man in the world. Can we sound the depths of nature, labor to develop her secrets, discuss her facts and phenomena, admit as truth only what is really so, and not follow and profess truth in the conduct of life ? The love of truth which leads to these researches, ought to extend to morality and become a principle, as labor becomes habit. This idea might be expanded, if the practice of philosophy and the study of the sciences needed an apology."

The above is a translation of a passage in the preliminary discourse of Monsieur Bailly to his history of ancient astronomy. It appears to me to contain a great deal of truth and a great deal of fallacy commingled in a very small space. It is unquestionable that the same love of truth which will lead a man to the study of philosophy *ought* to lead him also to the study of moral truth, and to the practice of virtue and religion. But it does not follow, as M. Bailly evidently intends to say that it does, that there is any necessary connection between the study

of science, and the love and practice of virtue and holiness. For, first of all, it is very certain that of the multitudes who study science, very few are actuated by a pure love of truth. It is a hackneyed metaphor, but expresses a truth, that of those who woo philosophy, as many are attracted by her dowry as by her personal charms. Indeed, it is not improbable that all philosophers are at first led to the study by a desire of action, more than by a pure and unmixed love of knowledge and truth.

Then again, it is quite a possible case that a man actuated by a pure love of truth, may so concentrate his attention upon one department of truth as to give less than an ordinary attention to other departments. In fact it appears that, with the feeble and sinful nature of man, this is almost a necessary consequence of an earnest devotion to literary and scientific pursuits. Every one knows in regard to the ordinary transactions of business, that the man of deepest research is not necessarily the man of soundest sense, not the man whom we would most confidently consult in any matter of difficulty. Napoleon expressed this well and tersely in speaking of La Place, whom he had appointed to a high office in the state on the ground of his unrivalled scientific attainments. "He carries the method of *infinite divisibles* into every thing." And if it be so in regard to matters of mere business, how much more may we expect it to be in regard to the higher claims that rest upon man as a moral and immortal being? It is quite true that a man's mind, when following out a train of philosophical research, is better employed than in hatching a political plot, or planning some deed of mischief towards his fellow men. But then it is just as true on the other hand, that it is worse employed than it would be in excogitating some plan of active beneficence, or holding communion with God.

But even if these fallacies, as they appear to me, were got over, there is another assumption that seems to me not less fallacious than they. It is this, that the mere knowledge of truth, even in regard to morals, necessarily leads to virtue. The Bible says, and every one knows and feels that it says truly, "If ye know these things, happy are ye if ye do them;" and every one knows and feels further, that if a man know what is right and do it not, he is more culpable than if he did not know it.

The conclusion of the whole matter seems to be this, that philosophy never can be the foundation of morality. That must be built on Christianity. To the Christian, indeed, philosophy has most important uses; but still Christianity without philosophy will make a man good and happy, while philosophy without Christianity may only make him worse and more wretched than he would otherwise be. Thus it is that "to the pure all things are pure." To the real Christian, every acquisition of knowledge is a real benefit; to every other man, it is as real an injury. "Knowledge is power," and power is a good or an evil just according to the purpose to which it is applied. He who applies it to good ends will be blessed by it; this only the Christian does; while he who applies it to evil ends, were better did he not possess the power at all. Thus it is that "the fear of the Lord is the beginning of wisdom."

WIRE DRAWING.—A QUERY.

To the Editor of the 'India Review.'

SIR,

Dr. Carpenter in his "popular Cyclopædia of Natural Science" states, speaking of the ductility of metals, that when drawn into wires they present a very curious and unexpected result. "Although the *particles of the wire are really less close together after the operation of drawing than they were before,* yet they hold together more firmly; so that the tenacity of the Wire or its power of sustaining a powerful strain without breaking is greater. The *increase in the distance of the particles from each other resulting from extension* is shown by the increased bulk of the Wire which is of course accompanied by diminished density, and it is very remarkable that in this condition it should have more tenacity than before."

I do not presume, Sir, to put my knowledge or judgment in opposition to Dr. Carpenter, who was I doubt not fully satisfied of the fact he states before committing it to the press: I cannot notwithstanding avoid confessing that I read the passage with some misgivings as to its correctness. I refer now strictly to the statement in the first part of the passage above quoted, from which I learn, for the first time, that *drawing* instead of pressing the particles of the metal closer together, absolutely sets them farther apart than they were before. So far as my experience extends, I think I have observed that the operation of drawing tends to increase rather than diminish the density of the metal, and that notwithstanding the extension of the mass, there has been a manifest increase of hardness, and so far as the apparent closeness of the grain presented on fracture, compared with its appearance previously, could justify the conclusion I should unhesitatingly avow my belief of its increased density, the effect being in a qualified degree precisely that which is produced by hammering, in which case the particles are not merely driven upon and amongst each other in the direction of impact, but are also spread out on all sides in a direction at right angles to the line of impact.

If my conjecture be at all near the truth, there is nothing, as it appears to me, either very curious or unexpected in the facts that the tenacity of the wire is increased: if on the other hand the Dr. be right, assuredly the result is curious enough and such as I should not have been led to expect.

The second portion of the passage quoted does not serve to place the matter in a more satisfactory light;—it only conveys the assurance that the distance of the particles from each other results from extension. That this is true of those particles which lie near the surface I can readily comprehend,—I see at once that in the operation they must be forced forward, and thus be separated from those particles which lie deeper or towards the centre of the mass. I do not see, however, that the mere relative displacement of the particles at or near the surface must necessarily lessen the density of the whole mass:—nor that the whole force expended in the operation acts only in a direction parallel to itself in this case any more than in the one I have instanced of metal subjected to the action of a hammer. Reasoning by analogy,

offer, only, such proof as my experience has furnished, and which I have already mentioned—namely—increased hardness and closeness of the grain of the metal as shewn by fracture.

I shall be extremely obliged to any of your correspondents whose knowledge and experience in matters of this nature, or rather on this particular subject, enable them to extricate me from the doubt and difficulty which beset my mind. I have referred to several works for information, but without success, and the opinions of several intelligent practical mechanics, to whom I have applied, have only helped to confirm me in my unbelief and obduracy.

Do me the favour to insert this in your Journal and believe me your well wisher.

AN ENQUIRER.

By the bye what does Dr. Carpenter mean by the increased bulk of the wire after drawing?

January 10th, 1844.

To the Editor of the 'India Review.'

Dear Sir,

It is an ungracious task to attempt to put a man out of conceit with his own inventions, and I hope you will believe me that it is no love of finding fault, much less any desire of diminishing the credit of the inventor, that induces me now to address you on the subject of Mr. Hudson's instrument described in your last number. My purpose, so far as I know my own heart, is simply to undeceive your readers, and prevent any of the younger ones of them from subjecting themselves to expense and fruitless labor in constructing an instrument that cannot possibly be of any use. Mr. Hudson's instrument is simply a barometer in which the fluid is air instead of mercury or water, for the water that is used in the so-called "Plenœrium" serves no purpose, but that of retaining the air in the tube, and indicating its expansion or contraction. Instead of being called a Water Barometer, therefore, it would be more fitly called an Air Barometer.

The only question then is, whether is mercury, water, or air, the fittest fluid to be employed as a counterpoise to the column of atmospheric air. The two former have been often subjected to comparative trial, and the first has been decidedly preferred to the second for various reasons, which it is not necessary now to mention. Either of these, however, is decidedly preferable to air, for this special reason, that the great elasticity of air, especially when condensed, renders its volume liable to perpetual variation by the constant fluctuations of temperature. To make this perfectly clear, suppose Mr. Hudson's instrument constructed, a few degrees of increase of temperature would expand the air in the bulb at the top of the tube, and cause the water to descend, exactly as if the pressure of part of the atmospheric column were removed. I have frequently used the common Barometer for the purposes of mensuration, and even with it, as Mr. Hudson is no doubt aware, a correction must be applied, when considerable exactness is required, for the change of the volume of the mercury with the change of temperature. Such a correction it would be altogether impossible

to apply to the instrument in question, and for this plain reason, that air being so much more elastic than any of the liquids wherewith thermometers are filled, a variation of temperature that could not be discerned by a thermometer would produce a powerful effect on the air-barometer. If any one doubt this, let him take one of Sir John Leslie's differential thermometers, and see how much the air in its bulb is expanded by the mere heat of his hand.

I trust Mr. Hudson will take these observations in good part. I wish him all manner of success in his attempts to improve our philosophical apparatus, and shall be the first to welcome and acknowledge a[illegible]l improvement that he may succeed in introducing.

With sincere desires for the success of your very useful and interesting Magazine.

I am, dear Sir,
Very truly yours,
ΒΑΡΟΜΕΤΡΙΚΟΣ.

Calcutta, 19th December, 1843.

REVIEW.

Novum Organon Scientiarum:—A New Machine of the Sciences; by Francis Bacon, Baron of Verulam, &c. Translated into English, by the Rev. Thomas Smith, of the Free Church of Scotland Mission, Calcutta.*

"Books," said Milton, "are not absolutely dead things, but do contain a progeny of life in them to be as active as that soul was whose progeny they are; nay, they do preserve as in a vial the purest efficacy and extraction of that living intellect that bred them. I know they are as lively, and as vigorously productive, as those fabulous dragon's teeth; and being sown up and down, may chance to spring up armed men." Of this antiquated and obvious truth, rendered at once novel and original by being so strikingly expressed, what work, in any age or nation or language can furnish a more complete exemplification than the "*Novum Organon*" of Bacon? The varied and transcendant merits of the noble author himself it would not be easy to particularize. His was so rare a combination of excellencies that to state with precision what he was or what he was not, might prove a task of equal difficulty. In the annals of all philosophy, there is not a more venerated or venerable name. The faults and the flaws, whether of his private or official character, we dare not in justice overlook, however much charity might long to drop her veil over them. But, it is not with Bacon as a *man*, individual, social, or official, that we have now to do; our immediate concern is with him, as a *philosopher*, or rather the "father of modern philosophy." In this high capacity he stands forth before us unrivalled and alone. Others equal or excel him in separate, distinctive, or special departments

* We trust that in the next edition this harsh translation will be altered into "a new instrument for the cultivation of the Sciences," or some equivalent expression.

of intellectual labour or scientific research. Locke excels him in subtility of metaphysical acuteness and elaborateness of inquiry into the nature, succession, and laws of the fleeting phenomena of spiritual being. Newton excels him in inventiveness and intensity of mental effort; in the vividness of his intuitions of time, space and force; and in the energy and stedfastness with which he seized and held, separated and combined, the most intricate assemblages of ever varying elements. Davy excels him in the adroitness and dexterity, the ingenuity and fertility of experimental resource. And so do many more;—each, in his own single, isolated, chosen province. But, in breadth and comprehensiveness of view, which constitute the distinguishing attributes of a *legislative mind*, whose peculiar function it is to penetrate into the heart of all great subjects, without stopping to pursue or master the minute details of any—seizing and describing their characteristic features, pointing out the ways, methods, and expedients of indefinitely adding new pillars and compartments of the temple of true science, without making any special addition of its own,—and thus elevating and converting its suggestions into laws, that affect alike every department of knowledge, and extends onward for the regulation and guidance of latest posterity;—in *such breadth and comprehensiveness of view*, Bacon indisputably excels them all.

Previous to the Reformation, the endless, and, for the most part, unprofitable disputations of antagonist schoolmen, conducted as these often were with the fiercest animosity and deadliest rancour, tended to produce a re-action against the scholastic system generally,—to diminish its credit and influence,—and to excite an undefined desire in many minds for a change in the objects and methods of philosophy. Still, from its inveterate reverence for antiquity, its hereditary submission to the authority of certain redoubtable names, its servile and unquestioning habit of imbibing and transmitting a fixed set of prescriptive ideas, the human mind was unable all at once to liberate itself from the insufferable yoke. It had been so long in swaddling bands, and accustomed merely to creep, that it was only as the result of many tentative efforts, attended by many awkward falls and sundry other mishaps, that it could expect to walk upright in its own strength. And even when it fairly began to learn to do so, it ever and anon felt, and manifested a fast cleaving tendency to lean on the crutches of antiquity, with its countless array of authorities, dogmas, and names. The first decided impulse, imparting a new energy and direction to the inquiries of speculative men, was communicated by the revival of Grecian Literature, after the capture of Constantinople, about the middle of the fifteenth century. The striking contrast between the polished and graceful refinements of classic lore, and the coarse and vulgar barbarisms of scholastic erudition had its due influence. The recovery of the works of the ancient philosophers, more particularly those of Aristotle and Plato, in their original integrity, and in the language of their authors, undistorted by lame and erroneous translation, exerted an influence still more decisive. Restored to something like primitive purity, and variously affecting different minds, these greatly helped to stir up earnest discussion regarding their respective merits, aim, and object. Such discussions served to awaken new thoughts, and kindle fresh desires. The very detection of the

radical discrepancies between the Aristotelian system, as hitherto derived at second hand, in mutilated forms and fragments, from the Arabian schools, and the same system as it was found to exist directly in the Original Greek, then newly recovered and made known to the Western nations, produced a powerful effect on the cause of a waning scholasticism. The genuine writings of Aristotle and Plato seemed to sweep away much of the rubbish, that had been ignorantly and surreptitiously accumulating in their name throughout bygone ages; while the antagonism of these rival systems, the collisions of opinion to which they led, their tendencies to run into the opposite extremes of rationalism and mysticism, and the various eclectic attempts to reconcile them to each other, and with the cabbalistic, atomistic, and stoic doctrines, and even with Christianity itself, all tended to loosen and unsettle the old order of things, and prepare the way for a new and better era.

The Reformation of Luther, by emancipating the mind from the thraldom of deadly error, in the most important and influential of all departments, that of religion, gave an impetus to the spirit of free enquiry in all directions, braced and invigorated the intellectual faculties, and mightily accelerated the progress of useful discovery. In the resuscitated Bible the treasures of Divine knowledge were found stored up, in such absolute plenitude, as to leave nothing to be supplied, and in such absolute perfection, as to leave nothing to be improved. But in science and philosophy, the case was widely different. The materials of these lay subjectively in the constitution of the human mind itself, and objectively in the visible works of creation. And as there existed no revealed or authoritative philosophy of the mind, and no revealed or authoritative science, even as there did exist a revealed authoritative infallible religion, it was clear that man was left in the ordinary use of his improved faculties, to excogitate a philosophy and a science for himself.

Though left thus free and unshackled in its excursive energies, it is at once curious and instructive to note the slowness with which the human mind came to mark out any clearly defined objects of pursuit, or to detect the erroneousness of its former methods of investigation. Even in cases in which the favourite dogmas of the schools were rejected, and the overawing authority, by which these were upheld, was despised, individuals, under the dominance of habits generated by the old exploded systems, only escaped from one whirlpool of error, to plunge into the vortex of another as hopeless and profound. Thus, one laboured to establish a system, based on the grand principle of a pretended "harmony and sympathy between salt, the body, and the earth—between Mercury, the Soul, and water—between sulphur, spirit, and air." Another, who did his utmost to abolish the Aristotelian philosophy, maintained "the existence of the incorporeal and active principles, heat and cold; and a corporeal passive principle, matter; on which the other two exercise their influences—deriving the heavens from heat, and the earth from cold—and attempting to account for the origin of secondary natures by a supposed perpetual conflict between the heavens and the earth."

Utterly dissatisfied with these and similar vagaries, individuals did here and there arise, who proposed to arrive at more certain conclu-

sions by the methods of observation and experiment; but their views, at best feeble and inadequate, were neither propounded nor exemplified with sufficient ability or success to command general attention, or revolutionize the general bent and current of opinion. On the whole, the state of things, as regards Science and Philosophy, during the *transition* period under review, may not be better stated or in fewer words, than it has been by Tennemann. "We perceive," says he, "that the human mind attempted many paths, already opened, to the mysteries of knowledge by the ways of revelation, reason, and experiment. None of them had been pursued far enough; because, occupied with the pursuit of results and conclusions, men had omitted to begin with examining themselves, and their own faculties, instead of the objects contemplated by the latter. They had not yet enquired in what respects revelation may be justly expected to supply information: nor had the pretensions of reason and experiment to be severally the fountain heads of knowledge, been balanced or adjusted. A sort of scepticism, grounded on experiment and observation, discouraged the pride of human reason, without having the effect of silencing its inquiries; and rather busied itself with diving again into the exhausted mines of ancient disputes, than attempted any fresh proofs of the certainty of knowledge. A species of intellectual anarchy and chaos seemed for a time to prevail: the more exact knowledge derived from the writings of the ancients contributing rather to increase than to still the commotion; till it ended in something like a universal *fermentation*, which slowly defecated. An immense mass of unorganized knowledge and misdirected views contended together, till the necessity came to be gradually felt of more systematic and better founded inquiries; and to attain this end gigantic efforts were made, which became continually more effectual and more universal."

In the midst of this general chaos and fermentation of opinion, Bacon arose, like the sun in a clear firmament after the chilling fogs and frosts of a long winter. With the boldness of an heroic and adventurous spirit, and the fearlessness of a noble and independent mind, confident in its own resources, he wholly forsook the beaten paths, and proposed nothing less than a radical reform in Philosophy, and a re-construction of the entire edifice of human knowledge. In order to this, he had to sweep away the rubbish of existing systems, prejudices, and superstitions. This he triumphantly did, in ways and forms the most diversified, not so much by assailing them in minute detail, as by tearing up the common roots whence they sprung, and by holding up to the contempt of enlightened reason the fallacious principles on which they all proceeded. He had to review the entire domain of science and Philosophy, in order to separate such rudimental notions as had been blended and confounded; to distinguish results apparently identical, but flowing from diverse and even opposite sources; to draw clear lines of demarcation between various branches of knowledge, and, at the same time, point out the secret links of their concatenation and harmony; to unravel the boundaries between the Physical and Metaphysical, and allot to each its proper objects, both as regards the materials of cognition, and their distinctive order of causes and effects. All this he achieved with inimitable skill and masterly power of execution in his great work, *De Augmentis Scientiarum*, for the improve-

ment and enlargement of the sciences. Above all, as the improvement and enlargement of the sciences essentially involved the *promotion of discovery*, as a *distinct and specific end*, it is obvious, that it behoved him to point out an *improved* and *adequate method* for the attainment of such end. This he also accomplished with consummated ability, as his crowning contribution to the cause of true knowledge, in the greatest of all his works, the NOVUM ORGANON SCIENTIARUM, *the new instrument or method for the cultivation of the Sciences.*

What, then, is the peculiar path or method, so clearly marked out by him, and since trodden or followed with such marvellous success? It is ordinarily described as the path or method of "*induction and experiment*," as contradistinguished from that of "*syllogistic proof by argument.*" This is true, so far as it goes ; but it is not definite enough, and scarcely does justice to the noble author. The old "*organon*," or intellectual instrument of Aristotle, was neither calculated for discovery, nor, strictly speaking, for proof. Dealing with words or language rather than with thoughts or ideas, the Aristotelian *organon* is an admirable instrument for detecting and exposing the fallacies of the former, while it can only indirectly aid the latter. And as the conclusion is always, or ought to be, involved in the major premis of the syllogism, there can neither be discovery nor proof, in the highest and most proper sense of these terms. Disputation, argument, persuasion may by such means be abundantly promoted, but nothing more. Such an instrument, therefore, could never suit the grand and novel design of Bacon. Such a design demanded the invention and application of a "*novum organon*," a *new instrument*, or sounder method of scientific inquiry than had been recognized, or at least, steadily and systematically acted on before. And this method may doubtless, in a general sense, be described as that of *observation and experiment by induction.*

In what respect the method may be fairly entitled to the designation "*new*," may be made very briefly to appear. The general spirit of the Scholastico-Aristotelian system lay in this ;—that it *assumed* and laid down dogmatically, as first principles, certain mere abstractions, or abstract principles, notions or ideas ; and that, from these, it attempted, by the syllogistic method, to deduce or draw out a universal system of knowledge. Now, as the series of consecutive truths composing such system was deductively drawn from these *gratuitously assumed* abstractions or fontal principles, it is manifest that there could be no progress, no discovery. All system builders, proceeding on this plan, uniformly began where they ought to have ended. The reason for their doing so may, probably, be traced in part to the almost idolatrous admiration of the ancients for mathematical science. This science, on account of the clearness of its first principles, the perspicuity of its method, and the demonstrative certainty of its proofs, was dignified by the Greeks with the name of μαθησις, *knowledge* or *science itself.* It consists in *assuming* certain *first principles*, or *intuitive truths*, obvious to the faculty of reason, *independent of observation or experience.* These principles are so simple, so irresistible in the force of their internal evidence, that the mind cannot but perceive them ; yea, and so necessary to all the purposes, alike of science and of life, that it cannot proceed one step in theory or practice, without the tacit or

avowed admission of them. Now, on these principles, thus assumed without any protracted observation or accumulated experience, the mind proceeds, still independently of the aid of observation and experiment, to found proposition after proposition, in a gradually advancing series, till it eliminates truths of a nature, not only remote from ordinary apprehension but from all previous anticipation. It was this total independence of the first principles of mathematical science on the evidence of sense, which led to Aristotle's remarks ;—"It is evident," says he, "that sense is not concerned in this knowledge (geometry). For, if we could perceive by sense, that the three angles of a triangle were equal to two right, yet should we not rest satisfied in this, but would yet seek after a demonstration of it ; sense reaching only to particulars, but knowledge to universals." Different altogether is the case with the science of Physics, or that which treats of the laws of matter and Metaphysics, or that which treats of the laws of mind. These sciences, professing to descant on the *actually existing* properties and functions of body and mind, must, from the very nature of the case, depend upon *observed facts* and *ascertained phenomena.* It is from the careful collection, examination, and comparison of such facts and phenomena alone, that they can at last be classified and reduced under general laws,—physical facts being derived from the testimony of *sense*, and metaphysical, chiefly from that of *consciousness.* Now, here, was the grand mistake committed by the Grecian Philosophy. "Enamoured," as a late writer on Mental Philosophy has remarked, "of mathematical speculations, and of the certainty, elegance, and simplicity of geometrical proof, they seem to have wished to introduce into physical research the same simplicity of principle, and elegance of arrangement. Not aware that all knowledge of the phenomena of nature must rest upon the basis of experience, and accurate observation, they attempted to establish a system of physical science by a synthetic deduction from a few assumed general principles, instead of by a careful analysis of the varied appearances which nature exhibits." But, be the cause what it may, certain it is that such was the practical procedure of the Grecian Schools ; and this style of procedure they left as an hereditary legacy to the successive races of schoolmen that figured throughout the middle ages. Now, this is the very mode or method of Philosophizing which Lord Bacon exactly reversed. He at once resolved to reject all such *assumptions* from the varied domain of Physical and Metaphysical Science,—in the former, appealing to *observation* and *experiment*, and in the latter, to *consciousness.* Appealing to these sources of information, his purpose was, by beginning with and collecting *particulars, inductively* to arrive at *established universals ;* not by beginning with *assumed universals, deductively* to arrive at a *system of particulars.* His purpose was, from a knowledge of ascertained facts, to ascend to the knowledge of some general harmonizing principle, and thence to a higher generalization, and thence to a higher still, in onward enlarging progression. Such is the true and legitimate method of *induction.*

What ! then, it has been almost scoffingly asked, Was Bacon the *first* who discovered and applied the method of induction? No ; certainly not, if the pith of the method lie in observation and experiment of any kind, and in drawing conclusions and founding practical rules

of conduct on both. Men, in all ages since the world began, must have observed and experimented more or less; and been guided in a higher or lower degree by ascertained results. Aristotle himself makes mention of induction, and so do many of his successors;—while, in particular and isolated cases, not a few were found to exemplify it. But what is averred, is, that *all* of these entertained, comparatively, but *loose*, *casual*, *indeterminate*, and *ill-defined* views on the subject—that they were by no means alive to the *paramount* importance of the principle, and that they never appreciated it, in all the length, breadth and magnitude of its varied bearings and applications. What is averred, on the other hand, is, that Bacon was the *first* who seized on the principle—with a *firm*, *steady*, *resolute*, *philosophic* grasp,—that he was the first who expounded it with such commanding energy of thought and language as to arrest and fix the gaze of the learned world and enforce general attention to its pre-eminent importance,—that he was the first who clearly saw and with unsurpassed sagacity pointed out its endless variety of application and inexhaustible productiveness. To this achievment of Lord Bacon may be applied and accommodated the spirit of Paley's remark, in reference to a totally different subject, "It is idle to say, that the method of induction, as such, had been discovered, already;—It was discovered as the Copernican system was;—it was one guess among many. He alone discovers, who *proves*."

But this is not the whole; neither is it the most *characteristic* feature of the Baconian philosophy. Even in cases, where the *a priori* mode of beginning with the assumption of abstract principles was abandoned, and men felt impelled to resort to the *empirical* or experimental method,—even then, the ancient, vicious, and uniform practice was, *to leap at one bound* from a few meagre facts of observation and experiment, to general principles and universal theories; without passing through the intermediate succession of steps, or regular gradation of ascents, which alone would have ensured not merely a general but a sound conclusion, and not merely a universal but a true theory. This inveterate and invariable habit of all speculators, from the time of Aristotle downwards, is what Bacon so strongly denounces as an unwarranted "anticipation," and not a legitimate "interpretation" of nature. This path of "illicit and hasty generalization," says he, "is one which the intellect follows when abandoned to its own impulse; and this it does from the requisitions of logic. For the mind has a yearning which makes it dart forth to generalities, that it may have something to rest in; and after a little dallying with experience, becomes weary of it; and all these evils are augmented by logic, which requires these generalities to make a show with its disputations." Now, we quite agree with Mr. Whewell, one of the most competent judges of our day, that "by far the most extraordinary parts of Bacon's works are those in which, with extreme earnestness and clearness, he insists upon a *graduated and successive induction*, as opposed to a hasty transit from special facts to the highest generalization. The nineteenth axiom of the first Book of the *Novum Organon* contains a view of the nature of true science, most exact and profound; and, so far as I am aware, at the time *perfectly new*. 'There are two ways, and can only be two, of seeking and finding truth. The one from sense and particulars, takes a flight to the most general axioms, and from those prin-

ciples and their truth, settled once for all, invents and judges of intermediate axioms. The other method collects axioms from sense and particulars, *ascending continuously and by degrees*, so that in the *end* it arrives at the most *general* axioms; this *latter* way is the *true one* but hitherto *untried*." It is to be remarked, that in this passage Bacon employs the word *axioms* to express any propositions collected from facts by induction, and thus fitted to become the starting point of deductive reasonings. How far propositions so obtained may approach to the character of axioms in the more rigorous sense of the term, is a question that does not here immediately concern us. The truly remarkable circumstance is to find this recommendation of a *continuous advance* from observation, by limited steps, through *successive gradations of generality*, given at a time when speculative men in general had only just began to perceive that they must begin their course from experience in some way or other. How exactly this description represents the general structure of the soundest and most comprehensive physical theories, all persons who have studied the progress of science up to modern times can bear testimony. And the view which Bacon thus took of the true progress of science was not only *new*, but, so far as I am aware, has not been *adequately* illustrated up to the present day. In catching sight of this principle (that of the successive subordination of many steps, all leading up at last to some wide and simple truth) and in ascribing to it its due importance, Bacon's sagacity wrought unassisted and unrivalled. Of these two ways, namely, that of hasty and illicit generalization, on the one hand, and that of gradual and successive generalization, on the other, Bacon himself emphatically remarks, that, while "both begin from sense and particulars, their discrepancy is immense. The one merely skims over experience and particulars in a cursory transit; the other deals with them in a due and orderly manner. The one, at its very outset, frames certain general abstract principles, but useless; the other gradually rises to those principles which have a real existence in nature."

There are many other points on which it was our intention to expatiate; such as, the inestimable value of many of Bacon's isolated and even incidental maxims, ingenious proposals, and striking and brilliant thoughts, strewn up and down, throughout all his works;—the earnest and even vehement expression of his own glowing hopes and boundless expectations of ultimate triumph, hopes and expectations so evidently founded on no shallow grounds, and betraying nought of the heated fancy of a dreamy or bewildered visionary;—the much agitated questions, as to whether the Baconian philosophy can be fairly chargeable with materialistic tendencies, or whether, according to the dictum of a celebrated Reviewer, "utility and progress" be its *chief end* and *design*:—but, on these and other interesting and important topics, time and space preclude us from entering at present.

As to the work now before us,—which circumstances over which we had no control prevented us from noticing earlier—a new translation of Bacon's *Novum Organon*, it is impossible to write, otherwise, than in recommendatory terms. Mr. Smith had no ordinary difficulties to contend with; and it must have required no small share of honest enthusiasm and moral intrepidity to encounter them. The *first* serious difficulty which, as an author, he had fairly to

confront, was the prospect—we will not say, of remuneration for his services, for these we are sure were designed to be purely gratuitous,—but of protecting himself from actual pecuniary loss. Despite the vauntings of this boastful age of intellectualism, it is truly marvellous how very little most readers do really *think*. Accordingly, we find that they are the light and airy and ephemeral products of wit and fancy, the exciting narratives of incident and travel, which require little or no thought, but furnish pleasurable sensations, during a passing hour—that find the widest circulation. The age of ponderous folios and quartos, fraught with the stores of profound reflection and laboured erudition, is gone within the busy realms of political and commercial activity. Even the octavo of condensed matter and thought is at a discount. And if this be true of the wide and extensive reading circles of a *home* British public, how much more may it be expected to be true of the diminitive range of a distant, thinly scattered, Anglo-Indian community? In point of fact, do not novels, travels, pamphlets, and periodicals constitute the main bulk of our current Literature? And these are chiefly from home. How few original works of any kind, published in India, have repaid the author for his necessary outlay! What chance, then, in such an age and in such a community, for the sale of a work like the new translation of the *Novum Organon*—fraught as it is throughout with the solid, the massive, the profound? Ah!—but the work was intended for native educational Institutions. The greater shame is it that there should be room for even the suspicion, that that was mainly designed for native youth, which was found to transcend either the taste or the ability of British masters! But, letting that pass,—has the encouragement given to the preparation and publication of superior original text books, whether for schools or Colleges, been such as to stimulate the exertions of those who might furnish the requisite supply? Past experience says, No. Has the Government*, of this land which can lavish *lacs* and *crores* on doubtful conquests and worthless pageants, ever *adequately* encouraged the growth and multiplication of new and totally adapted works, even of a literary, scientific, or simply moral description, suited to develope aright the faculties of the young, invigorate the energies, and confirm the salutary impressions of the mature? Past experience says, Never. And in the face of these notorious facts, it surely did seem to indicate somewhat of the boldness of the spirit of enterprize, on the part of our author, to launch his adventurous bark on the wide ocean of uncertainty.

But by far the most formidable difficulty must have arisen from the very nature of the undertaking itself. They are only superficial sciolists who think lightly of the work of translation from one language to another, differing essentially in its frame and idiom—as if it involved a mere amount and expenditure of mechanical drudgery! The truth is, that the department of effective translation is one of the most arduous within the whole range of literary erudition, requiring, even for its approximate perfection, a combination of gifts and attainments which fall to the lot of few. And the difficulty of the task is of

* The present Deputy-Governor of Bengal has, we doubt not, all the *will*;—why should he not also be delegated with all the *power*?

course vastly enhanced, when, independently of the general one arising from diversities of lingual structure and idiom, there may be superadded the special one arising from peculiar felicities of style and sentiment, on the part of the author. Hence the remark of a noble critic, in reference to a proposal for a new translation of Demosthenes' celebrated "Oration upon the Crown;"—"Either," said he, "the translation is addressed to those who know the original, or to those who do not. The former cannot want it; the latter cannot materially profit by it; for no translation can give an adequate idea of the original." Though such a remark, when taken in its strict literality, must be regarded as too strong, it may well be viewed as a forcible representation of the real difficulty by one of the best qualified of judges. Now, a somewhat similar remark might, not inappropriately, be made in reference to the *Novum Organon* of Lord Bacon. Composed in a language whose genius is, in many respects, so different from that of the English; and pre-eminently distinguished, beyond most other works, by excellencies and peculiarities both of style and thought;—the translation of it, in a worthy and adequate manner, has been regarded as a sort of "forlorn hope" by the ablest scholars. Thus writes Dugald Stewart, one of the greatest masters of language and philosophy in our day:—"I once intended," says he, in apologising for the *Latin* extracts from Bacon, with which he was obliged to load a few pages of dissertation, "I once intended to have translated them; but found myself quite unable to preserve the weighty and authoritative tone of the original. There is something, besides, in the *ipsissima verba* employed by Bacon, which every person, much conversant with his works, regards, with a sort of religious reverence; and which, certainly, lays hold on the imagination and of the memory with peculiar facility and force. I wish, at the same time, most anxiously to see an English version of the *Novum Organon*, executed by some skilful hand, in order to bring it within the reach of a more numerous class of readers. I do not known a more acceptable service which any individual could render to philosophy; and the extreme difficulty of the task would render it an undertaking worthy of the greatest talents."

With these and other difficulties staring him in the face, our author manfully went straight forward to his task. As to security from pecuniary embarrassment, he was eventually to a great extent relieved, much to its credit, by the Calcutta Christian School Book Society, which has already rendered inestimable services to the cause of Native Education. As to the execution of the task, or the merits of the translation itself, as such, we can testify, after a pretty extensive comparison of it with the original, that they are of a superior order. That the spirit, force, condensed pith, and frequent antithetic terseness of the unrivalled original, are always conveyed in their freshness and integrity, is what no one can allege, and least of all the ingenuous translator himself. But this we do say, that the arduous task has been accomplished in a way to indicate both taste and scholarship of no ordinary kind. Even in its present form, the rendering is, for the most part, characterized with general fidelity and correctness; and not unfrequently, with considerable precision, beauty, and force. We hope and trust that the present edition will be speedily exhausted, and that the author will be called on for another and another in rapid

succession. In this case, a series of careful and thorough revisions may entitle us ultimately to expect a version, not merely better than any of its predecessors, but as nearly approaching the standard of the original as the different genius and structure of the English language can well admit. For, often it may be found, that the substitution, addition, or omission of a single term, the slight inversion of a single clause or phrase, the variation or altered position of a single particle, will prove like the last delicate touches of a painter, which may be so imperceptible as to elude every eye but his own, and yet may be sensibly felt in the general and combined effect.

But, besides such revision of the text itself,—a text so worthy, and so sure to repay any amount of labour bestowed on it,—we would crave the author's serious attention to one or two points respecting the *Notes*. He has already done well in supplying a few of these. And such as he has given are, on the whole, excellent and appropriate. One or two slight and unimportant inadvertencies, sufficiently account-ed for by haste or oversight, might be pointed out. For example, page 50, it is said that "it was *reserved* for Dr. Thomas Brown, *to set the example* of applying it (the Baconian method of induction) to mental science." Now, great as Dr. Brown's merit certainly is, in applying this method, it can scarcely be said that it was *reserved* for *him* to *set the example*. The example was already set by Dr. Reed and Dugald Stewart. The latter, in particular, glories in having, in all his metaphysical pursuits, followed the plan of "inductive investigation pointed out by Bacon;" and the second preliminary dissertation, in his volume of Philosophical Essays, is written chiefly to vindicate this fact, and to show "how exactly his views coincide with the general spirit of the *Novum Organon*." And for the term "metaphysics" he distinctly proposes to substitute the more appropriate designation of "the inductive Philosophy of the Human Mind."

What, however, we have chiefly to complain of, in respect to the *Notes*, is the *scantiness of their number*.

The author has noted the bearing of one of Bacon's aphorisms on Hume's Infidel argument against Miracles. He has quoted Cowper's lines on the merits of the ancient Philosophers. Now, what we desiderate is an *extension* of this department of annotation, a department of vital importance to the best interests of man. In the prosecution of it, many a solemn and weighty passage might be seasonably introduced from some of Bacon's other works; and thus might the youth of India be habituated to associate the profoundest philosophy with the profoundest reverence for the oracles of eternal truth. Take the following as a specimen :—

"If then such be the capacity and receipt of the mind of man, it is manifest, that there is no danger at all in the proportion or quantity of knowledge, how large soever, lest it should make it swell or out-compass itself; no, but it is merely the quality of knowledge, which, be it in quantity more or less, if it be taken without the true corrective hereof, hath in it some nature of venom or malignity and some effects of that venom, which is ventosity or swelling. This corrective spice, the mixture whereof maketh knowledge so sovereign, is charity, which the apostle immediately addeth to the former clause; for so, he saith, "knowledge bloweth up, but charity buildeth up;" not unlike unto that which he delivereth in another place: "If I spake," saith he, "with the tongues of men and angels, and had not charity, it were but as a tinkling cymbal;" not but

that it is an excellent thing to speak with the tongues of men and angels, but because, if it be severed from charity, and not referred to the good of men and mankind, it hath rather a sounding and unworthy glory, than a meriting and substantial virtue. And, as for that censure of Solomon, concerning the excess of writing and reading books, and the anxiety of spirit which redoundeth from knowledge; and that admonition of St. Paul, "that we be not seduced by vain philosophy;" let those places be rightly understood, and they do indeed excellently set forth the true bounds and limitations, whereby human knowledge is confined and circumscribed; and yet without any such contracting or co-arctation, but that it may comprehend all the universal nature of things: for these limitations are three. The first, that we do not so place our felicity in knowledge, as we forget our mortality. The second, that we make application of our knowledge, to give ourselves repose and contentment, and not distaste or repining. The third, that we do not presume by the contemplation of nature to attain to the mysteries of God. For this third point, it deserveth to be a little stood upon, and not to be lightly passed over: for if any man shall think by view and inquiry into these sensible and material things to attain that light, whereby they may reveal unto himself the nature or will of God, then indeed is he spoiled by vain philosophy: for the contemplation of God's creatures and works produceth (having regard to the works and creatures themselves) knowledge; but, having regard to God, no perfect knowledge, but wonder, which is broken knowledge. And therefore it was most aptly said by one of Plato's school, "that the sense of man carrieth a resemblance with the sun, which, as we see openeth and revealeth all the terrestrial globe; but then again it obscureth and concealeth the stars and celestial globe; so doth the sense discover natural things, but it darkeneth and shutteth up divine." And hence it is true, that it hath proceeded, that divers great learned men have been heretical, whilst they have sought to fly up to the secrets of the Deity by the waxen wings of the senses: and as for the conceit, that too much knowledge should incline a man to atheism, and that the ignorance of second causes should make a more devout dependence upon God, who is the first cause: first, it is good to ask the question which Job asked of his friends: "will you lie for God, as one man will do for another, to gratify him?" For certain it is, that God worketh nothing in nature but by second causes; and if they would have it otherwise believed, it is mere imposture, as it were in favour towards God; and nothing else but to offer to the author of truth the unclean sacrifice of a lie. But farther, it is an assured truth, and a conclusion of experience, that a little or superficial knowledge of philosophy may incline the mind of man to atheism, but a farther proceeding therein doth bring the mind back again to religion; for in the entrance of philosophy when the second causes, which are next unto the senses, do offer themselves to the mind of man, if it dwell and stay there, it may induce some oblivion of the highest cause; but when a man passeth on farther, and seeth the dependence of causes and the works of providence; then, according to the allegory of the poets, he will easily believe that the highest link of nature's chain must needs be tied to the foot of Jupiter's chair. To conclude, therefore, let no man, upon a weak conceit of sobriety, or an ill applied moderation, think or maintain, that a man can search too far, or be too well studied in the book of God's word, or in the book of God's works; divinity or philosophy; but rather let men endeavour an endless progress or proficience in both; only let men beware that they apply both to charity, and not to swelling; to use, and not to ostentation; and again, that they do not unwisely mingle, or confound these learnings together.

Again, the author has supplied various examples illustrative of Bacon's principles. Those furnished are excellent, but scores and hundreds more are required to render the work useful in the highest degree. And amongst such illustrative examples we would suggest the propriety of furnishing a brief popular statement of the successive steps of generalization by which Newton at length arrived at the law of universal gravitation, as affording, perhaps, the most perfect realization of the Baconian method which the world has yet seen. It would be also of vast moment, thoroughly to illustrate the "Idols of the Mind" by a distinct and specific reference to the existing state of opinion and practice amongst the Hindus.

Once more, the author has, in several instances, called in question the accuracy of Bacon. But such notices, to be of real utility, ought to be more full and explicit. To mark out any errors, whether in principle or detail, would not detract from Bacon's well-earned fame. Considering the age in which he wrote, such errors, more or less, must have been absolutely unavoidable. The real wonder is that they are *so few.* Not to notice them at all would be to leave the Native Student, unless under the guidance of a skilful master, puzzled and perplexed. To notice them, with a special reference to the causes that led to them, would operate as a salutary warning, would serve to banish the tendency to idolize any human being however exalted, and would help to annihilate the pretensions to infallibility on the part of man. As an effective specimen of the mode of pointing out Bacon's errors, even in applying his own principles, we quote the following passage from Whewell's critique. It is long, but not longer than the importance of the subject warrants :—

"Thus Bacon, in his speculative philosophy, took firmly hold of both handles of science ; and if he had completed his scheme, would probably have given due attention to ideas, no less than to facts, as an element of our knowledge ; while in his view of the general method of ascending from facts to principles, he displayed a sagacity truly wonderful. But we cannot be surprised, that in attempting to exemplify the method which he recommended, he should have failed. For the method could be exemplified only by some important discovery in physical Science ; and great discoveries, even with the most perfect methods, do not come at command. Moreover, although the general structure of his scheme was correct, the precise import of some of its details could hardly be understood, till the actual progress of Science had made men somewhat familiar with the kind of steps which it include.

Accordingly, Bacon's inquisition into the nature of heat, which is given in the second book of the Novum Organon as an example of the mode of interrogating nature, cannot be looked upon otherwise than as a complete failure. This will be evident if we consider that, although the exact nature of heat is still an obscure and controverted matter, the science of heat now consists of many important truths ; and that to none of these truths is there any approximation in Bacon's essay. From his process he arrives at this, as the "forma or true definition" of heat ;—"that it is an expansive, restrained motion, modified in certain ways, and exerted in the smaller particles of the body." But the steps by which the science of heat really advanced were (as may be seen in the history of the subject,) these :—The discovery of a measure of heat or temperature (the thermometer ;) the establishment of the laws of conduction and radiation ; of the laws of specific heat, latent heat, and the like. Such steps have led to Ampère's Hypothesis, that heat consists in the vibrations of an imponderable fluid ; and to Laplace's hypothesis, that temperature consists in the internal radiation of such a fluid. These hypotheses cannot yet be said to be even probable ; but at least they are so modified as to include some of the preceding laws, which are firmly established ; whereas Bacon's hypothetical motion includes no laws of phenomena, explains no process, and is indeed itself an example of illicit generalization.

One main ground of Bacon's ill fortune in this undertaking appears to be, that he was not aware of an important maxim of inductive science, that we must first obtain the measure and ascertain the laws of phenomena, before we endeavour to discover their causes. The whole history of thermotics up to the present time has been occupied with the former step, and the task is not yet completed : it is no wonder, therefore, that Bacon failed entirely, when he so prematurely attempted the second. His sagacity had taught him that the progress of science must be gradual ; but it had not led him to judge adequately how gradual it must be, nor of what different kinds of inquiries taken in due order, it must needs consist, in order to obtain success.

Another mistake, which could not fail to render it unlikely that Bacon should really exemplify his precepts by any actual advance in science, was, that he did not justly appreciate the sagacity, the inventive genius, which all discovery

requires. He conceived that he could supersede the necessity of such peculiar endowments. "Our method of discovery in science," he says, "is of such a nature, that there is not much left in acuteness and strength of genius, but all degrees of genius and intellect are brought nearly to the same level." And he illustrates this by comparing his method to a pair of compasses, by means of which a person with no manual skill may draw a perfect circle. In the same spirit he speaks of proceeding by due rejections; and appears to imagine that when we have obtained a collection of facts, if we go on successively rejecting what is false, we shall at last find that we have, left in our hands, that scientific truth which we seek. I need not observe how far this view is removed from the real state of the case. The necessity of a conception which must be furnished by the mind in order to bind together the facts, could hardly have escaped the eye of Bacon, if he had cultivated more carefully the ideal side of his own philosophy. And any attempts which he could have made to construct such conceptions by mere rule and method, must have ended in convincing him that nothing but a peculiar inventive talent could supply that which was thus not contained in the facts, and yet was needed for the discovery.

Since Bacon, with all his acuteness, had not divined circumstances so important in the formation of science, it is not wonderful that his attempt to reduce this process to a technical form is of little value. In the first place, he says, we must prepare a natural and experimental history, good and sufficient; in the next place, the instances thus collected are to be arranged in tables in some orderly way; and then we must apply a legitimate and true induction. And in his example, he first collects a great number of cases in which heat appears under various circumstances, which he calls "a muster of instances before the intellect," (comparentia instantiarum ad intellectum,) or a Table of the presence of the thing sought. He then adds a Table of its absence in proximate cases, containing instances where heat does not appear; then a Table of Degrees, in which it appears with greater or less intensity. He then adds, that we must try to exclude several obvious suppositions, which he does by reference to some of the instances he has collected; and this step he calls the exclusion, or the rejection of natures. He then observes, (and justly,) that whereas truth emerges more easily from error than from confusion, we may, after this preparation, give play to the intellect, (fiat permissio intellectus,) and make an attempt at induction, liable afterwards to be corrected, and by this step, which he terms his first Vindemiation, or Inchoate induction, he is led to the proposition concerning heat, which we have stated above.

In all the details of his example he is unfortunate. By proposing to himself to examine at once into the nature of heat, instead of the laws of special classes of phenomena, he makes, as we have said, a fundamental mistake; which is the less surprising since he had before him so few examples of the right course in the previous history of science. But further, his collection of instances is very loosely brought together; for he includes in his list the hot taste of aromatic plants, the caustic effects of acids, and many other facts which cannot be ascribed to heat without a studious laxity in the use of the word. And when he comes to that point where he permits his intellect its range, the conception of motion upon which it at once fastens, appears to be selected with little choice or skill, the suggestion being taken from flame, boiling liquids, a blown fire, and some other cases. If from such examples we could imagine heat to be motion, we ought at least to have some gradation to cases of heat where no motion is visible, as in a red hot iron. It would seem that, after a large collection of instances had been looked at, the intellect, even in its first attempts, ought not to have dwelt upon such an hypothesis as this.

After these steps, Bacon speaks of several classes of instances which, singling them out of the general and indiscriminate collection of facts, he terms instances with prerogative; and these he points out as peculiar aids and guides to the intellect in its task. These instances with prerogative have generally been much dwelt upon by those who have commented on the Novum Organon. Yet in reality, such a classification, as has been observed by one of the ablest writers of the present day, is of little service in the task of induction. For the instances are for the most part, classed, not according to the ideas which they involve, or to any obvious circumstance in the facts of which they consist, but according to the extent or manner of their influence upon the inquiry in which they are employed. Thus we have Solitary instances, Migrating instances, Ostensive

instances, Clandestine instances, so termed according to the degree in which they exhibit, or seem to exhibit, the property whose nature we would examine. We have Guide-post instances, (Instantiæ Crucis,) instances of the parted road, of the Doorway, of the Lamp, according to the guidance they supply to our advance. Such a classification is much of the same nature as if, having to teach the art of building, we were to describe tools with reference to the amount and place of the work which they must do, instead of pointing out their construction and use;—as if we were to inform the pupil that we must have tools for lifting a stone up, tools for moving it sideways, tools for laying it square, tools for cementing it firmly. Such an enumeration of ends would convey little instruction as to the means. Moreover, many of Bacon's classes of instances are vitiated by the assumption that the "form," that is, the general law and cause of the property which is the subject of investigation, is to be looked for directly in the instances; which, as we have seen in his inquiry concerning heat, is a fundamental error.

Yet his phraseology in some cases, as in the "instantia crucis," serves well to mark the place which certain experiments hold in our reasonings: and many of the special examples which he gives are full of acuteness and sagacity. Thus he suggests swinging a pendulum in a mine, in order to determine whether the attraction of the earth arises from the attraction of its parts, and observing the tide at the same moment in different parts of the world, in order to ascertain whether the motion of the water is expansive or progressive; with other ingenious proposals. These marks of genius may serve to counterbalance the unfavourable judgment of Bacon's aptitude for Physical Science which we are sometimes tempted to form, in consequence of his false views on other points; as his rejection of the Copernican system, and his undervaluing Gilbert's magnetical speculations. Most of these errors arose from a too ambitious habit of intellect, which would not be contented with any except very wide and general truths; and from an indistinctness of mechanical, and perhaps, in general, of mathematical ideas:—defects which Bacon's own philosophy was directed to remedy, and which, in the progress of time, it has remedied in others.

But it is time to bring these cursory remarks to a close, The translator has deserved well of the friends of Native Education; and, if duly encouraged in his labours, he is yet destined to deserve still better. A nobler crown is his, than that of military conquest over half the nations, who successfully aids in achieving triumphs over the realm of ignorance, error, and superstition. And the glory of aiding in the achievment of such triumphs must surely be awarded to him who has unlocked the stores of Bacon's immortal work, and rendered these accessible to the awakening minds of the youth of India, in this the day of her labour and travail towards the manifestation of a new and better era.

As to Bacon himself, as already stated, he constructed no scientific theory or philosophical system of his own. This was his glory. One grand object of his philosophy was, to prove that theories and systems, to be of any value, must *succeed* not *precede* extensive observation and experiment,—that these must be superstructures reared by the joint contributions of many architects, whose patience and perseverence alone can ultimately realize what shall prove solid and enduring; not the edifices of a lively fancy and ready ingenuity, consisting of baseless abstractions, that may be combined, and separated, and re-combined, in shapes and forms as varied and evanescent as the configurations of the clouds. The judgment pronounced by himself on the system of his predecessor *Telesius*, who so vigorously attacked the Aristotelian scheme, but who was much "more successful in destroying than in building," at once exemplifies his own principles and practice. "It is," said he, "such a system as naturally proceeds from the intellect, abandoned to its own impulse, and *not rising from experience to theory continu-*

ously and successively." He studiously eschewed the renown of a mere system-builder, or mere founder of a new and particular school of philosophy. His design was nobler, grander, and vastly more comprehensive. It was to be the Reformer of all philosophy,—to be the pioneer of all scientific improvement. It was, by the practical exhibition of modesty, moderation, and good sense, to teach the world that nature, refusing to reveal her secrets in a mass to mere indolent guesses or closet conjectures, will surrender her precious stores only in partial instalments, proportioned to the patience, labour and industry expended in the research. In a word, it was, to be the harbinger and announcer of a new epoch—the expounder of a new method of philosophic and scientific inquiry—the discoverer of a new world which he left to others to conquer and explore,—or, in his own expressive language, "the trumpeter, who sounded the advance of the Reforming phalanx to battle, without entering the field of contest and glory himself," *Ego enim buccinator* tantum *pugnam non ineo.* In this point of view Cowley, in his poem to the Royal Society, happily compares Bacon,—

> "Whom a wise king, and nature, chose
> Lord Chancellor of both their laws,—"

to the Hebrew lawgiver, who, after having led the hosts of Israel through "the great and terrible wilderness," ascended Mount Pisgah, and there;—

> "Did on the very border stand
> Of the blest Promised land,
> And, from the mountain's top of his exalted wit,
> Saw it himself, and shewed us it."

This beautiful, but quaintly expressed comparison, has been taken up and finely paraphrased by Macauley, in his celebrated *critique* in the *Edinburgh Review;* and with it we may worthily close our notice. "It is to Bacon," says he, "as he appears in the first book of the *Novum Organon,* that the comparison applies with peculiar felicity. There we see the great Law-giver looking round from his lonely elevation on an infinite expanse; behind him a wilderness of dreary sands and bitter waters, in which successive generations have sojourned, always moving, yet never advancing, reaping no harvest and building no abiding city; before him a goodly land, a land of promise, a land flowing with milk and honey. While the multitude below saw only the flat sterile desert in which they had so long wandered, bounded on every side by a clear horizon, or diversified only by some deceitful mirage, he was gazing from a far higher stand, on a far lovelier country, following with his eye the long course of fertilizing rivers, through ample pastures, and under the bridges of great capitals, measuring the distances between marts and havens, and portioning out all those wealthy regions from Dan to Beersheba."

SELECTIONS

ASTRONOMY AND PHOTOGRAPHY AT ROME.

The following observations on the proceedings of the Collegio Romano during the years 1840 and 1841 will we doubt not prove so interesting to our readers that we make no apology for introducing them at a period so far removed from the time at which they originally appeared. The publication to which the observations refer does not appear to be generally known,—that circumstance and the importance of the subject induce us to give the article as it appears in the American Journal of Science and Arts, for the present year.—(ED)

"*A Memorial of sundry Observations made at the Observatory of the Gregorian University, in the Collegio Romano, by the Director,* P FRANCISCO DE VICO, and the other Astronomers of the Company of Jesus, in the years 1840 and 1841 Rome, 1842 Marini & Co., printers."

This publication, of which a copy has been with the greatest courtesy transmitted to this town, will command the attention of the scientific world, not only by the important information contained in it, but also as being the precursor of a series of annual memoirs, intended to contain reports of future astronomical operations at Rome, in the observatory of the Collegio Romano, which will henceforth take its place in the first rank of that class of the European scientific establishments.

The observatory at the Collegio Romano may, in fact, be considered as the oldest in Europe, having been the station from which Clavius made his observations on the new star of the constellation of Cassiopeia, in the year 1572 From that time it had in succession for its superintendents the Jesuit Scheiner and the illustrious Cassini, followed by Bianchini and Boscovich, who died in 1787

The wars of the French revolution interrupted for thirty years the peaceful pursuit of astronomy at Rome, but on the restoration of peace in the year 1816, Pope Pius VII constructed the present observatory, which Leo XII. in 1824 restored, along with the rest of the Collegio Romano, to the order of the Jesuits. Since that time the observatory has enjoyed the particular patronage of the Generals of the Order, the set of instruments having been augmented by a famous refracting telescope of Cauchoix, by an astronomical theodolite of Gambey, by an excellent chronometer of Breguet, and a capital meridian circle of Ertel. Whether it be through the superior excellence of this particular telescope, or the greater clearness of the Roman sky; the services obtained from it have been most efficient, and such as may give a new starting point for the science of astronomy.

By the reports given in the memorial just published, the advantages are fully shown which may be derived from observations of the periodical falling stars, in corroboration of lunar and planetary observations, for the accurate determination of the relative position of places; not otherwise attainable by geodesical measurement. The success of the operations used in the instances of Rome, Naples, and Palermo, as respects each other, fully establishes the fact The corrections obtained by these means have been adopted by the French astronomers in the Connoissance des Tems, although our Nautical Almanac is still in error. Taking the difference in longitude of Greenwich and of Paris at 9 minutes 21·5 seconds, the correct position of the Observatory at Naples will be 0*h*. 57*m* 1*s*·5 longitude east of Greenwich, and 40°. 51 46 6 north latitude; lessening by 7*s*.8, the longitude hitherto given for Naples in the Nautical Almanac.

The longitude of the Collegio Romano, at Rome, will then be 0*h* 49*m*. 5*s*.27 east of Greenwich, and its latitude 41° 53 52 north, increasing by 0*s* 57, the longitude hitherto given in the Nautical Almanac. It is to be observed that there is a difference of half a second of time in the longitude of Paris and Greenwich, between the reckoning of the Connoissance des Tems and that of the Nautical Almanac, which might as well be reconciled, seeing that they are both such great authorities, and Paris and Greenwich such noted astronomical stations

The mode of determining the longitude by observations of falling stars, was first suggested by Dr. Maskelyne, in the year 1783, and was made use of in 1802, in Germany, but it was reserved for the Neapolitan astronomer Nobili to perfect the method, and to point out the right way to be followed in the practice of those observations.

PHOTOGRAPHICAL DELINEATION OF NEBULÆ.

One of the first uses made by Galileo of the telescope, on its invention, was the examination of some of the most remarkable nebulæ, and the delineation of their then state, as if he had anticipated future changes in their constitution. In his Siderius Nuncius, published in the year 1610, he gave drawings upon a large scale of, the Pleiades, of the Belt and Sword of Orion, of the nebula in the head of Orion, and of the cluster of stars known as the Præsepe or Bee Hive, in the constellation Cancer. In these the ground is black, and the stars white. The positions of the stars are given with considerable precision, but there is no trace of the remarkable extent of lucid nebulous matter, nor of the deep black indenture and distinct outline which gives it something of the appearance of a bat's wing. The idea of perpetuating the appearance of this particular nebula of the Sword of Orion in his time, was taken up by Huygens, in the year 1656, and he has left what he vouches for a correct representation of it, as seen by him, but unaccountably passes over in silence the drawing left by Galileo. In Huygens's drawing and description, the shape of the nebula differs considerably from that which it now has, and the engraving in Sir John F. W. Herschel's Astronomy for the year 1833, is still more at variance with the present reality. In these circumstances, a doubt arises how far the apparent discrepancies are owing to actual physical changes in the nebula itself, or if they be owing to the imperfection of the instruments used, or of the vision or powers of accurate delineation possessed by the observers. That it is owing, in some degree, to physical changes is rendered probable, from alterations which have been seen to take place in the last three years. Fortunately, the Roman astronomers have hit on a means effectually to prevent future mistakes of vision or delineation. They have brought the Daguerreotype to bear on the object, and throwing the photographic image of the nebula and its stars on a lithographic stone, have, by an ingenious invention of the Signor Rondoni, which is still kept secret, fixed it there. From that stone they have been able to take impressions on paper, unlimited in number, of singular beauty, and of perfect precision, each star, each filmy nebulous streak faithfully depicting its own position. The scale is large, proportionate to the magnifying and light-collecting powers of the specula employed ; the effect is wonderful, and is heightened by being thrown on a beautiful deep azure ground. A globe must have upwards of fifty yards diameter, equal to the width of our Exchange area, to have room for so large a representation of the nebula in question. The same process has been applied, and with equal success, to the nebula in the Girdle of Andromeda. Altogether, it is a discovery of the highest importance to astronomical research.

The account of the labors of the Roman and Neapolitan astronomers upon these different objects is highly interesting, as an example of successful care and diligence. Besides a mass of lunar and planetary observations made with micrometrical accuracy, and those on the falling stars, for the purpose of ascertaining the difference of the longitude of their two observatories, the Signor De Vico has drawn up a table, by micrometrical measurement, of the apparent right ascension and declination of twenty-six stars encircling the double star Theta in the nebula of the Sword of Orion, and contained in a space hardly exceeding that of half the apparent disc of the sun. This table, combined with the corresponding photographic portrait, will detect any changes that time may effect in that which has been justly styled the "transcendently beautiful Queen of the Nebulæ." By using a magnifying power of 824 on some nights of extreme purity of atmosphere, Signor De Vico has also succeeded in resolving the nucleus of the nebula of Andromeda into a number of luminous points equal in splendor, and very close to one another. He promises to give hereafter the positions of some of the principal of the great number of exceedingly minute stars scattered over this nebula, which since the year 1612, when it was first observed by Simon Marius, has engaged so much of the attention of astronomers. Neither Marius, nor Messier nor Le Gentil could discern any star in it ; and even Sir John F. W. Herschel could not recognize "the slightest appearance to give ground for a suspicion of its consisting of stars." But a happily constructed telescope, with a purer sky, has led the Roman astronomers to a different result. Here again the Daguerreotype comes with powerful aid to assist their investigations, and numerous minute stars are seen distinctly sprinkled over the beautiful photographic portrait.

So far may be considered as the first part of this most important memoir. The

sequel contains observations on the ring and satellites of Saturn, and those by which the time of the rotation of the planet Venus on its axis, has at length been determined, and the spots of its disc correctly delineated. Ninety-one designs, on a small scale, of the appearance of the spots on the disc of Venus, taken at various times, are annexed to the present memoir, and a regular map, on a large scale, is announced for the next publication.

THE PLANET VENUS, ITS DISC, AND DIURNAL ROTATION.

Alma Venus! cœli subter labentia signa
Quæ mare navigerum, quæ terras frugiferenteis
Concelebras;—quoniam—suaves tibi dædala tellus
Summittit flores, tibi rident æquora ponti,
Placatumque nitet diffuso lumine cœlum,
Adv[illegible]. *Lucretius, lib.* 1.

From the time when astronomy became a regular science, the construction of a correct table of the planetary movements, diurnal and annual, rotatory and orbitual, has been a main object of research, and, in fact, the index of the progress made. The knowledge obtained by the ancients, through a long course of careful observation, received little or no increase, after the time of Ptolemy, until Kepler arose; for the Copernican system was only a revival of the Pythagorean, the origin of which is lost in the mist of time. But the discovery by Kepler of the law of orbitual motion, accompanied as it was by the almost simultaneous invention of the telescope, gave a new impulse, and bestowed precision and certainty on that which before was vague conjecture. The times of the diurnal rotation of the planets Mars, Jupiter, and Saturn; the position of their poles in space; the inclination of the planes of their equators to the planes of their several orbits; the inclination of the planes of those orbits on the plane of the ecliptic, and the longitude of their nodes, were soon determined with considerable accuracy. All this was done as far as regarded those more distant, or what are called the superior planets; but when the same points were sought for in respect to the two inferior and nearer planets Venus and Mercury, new difficulties occurred to baffle the best directed efforts. The abundance of the light, illuminating Venus and Mercury, was found to be a cause of greater obscurity than the scantiness of it at the distance of Jupiter and Saturn. Even all the recent improvements in achromatic telescopes have proved insufficient, in the cold and thick atmosphere of the northern division of Europe, to overcome the intense radiance of the solar beams, forcibly reflected from objects placed so near the Earth and the Sun as Venus and Mercury are.

The superior distinctness of telescopic observations in southern latitudes was early experienced, although there appears to have been an unwillingness to recognise the fact amongst the astronomers north of Florence. Francisco Fontana, the Neapolitan astronomer, was the first to discover the libration of the moon in latitude, which had only been by analogy and in anticipation asserted by Galileo, who only detected the libration in longitude. It was Fontana also, who first observed the spots on the discs of Venus and Mars. By these he endeavoured to ascertain the rotation of those planets, and on November 11th and 15th, and December 25th, 1645, and on January 22d, 1646, delineated from observation the phases presented by Venus. Like many others, in advance of the age in which they live, Fontana did not obtain the credence nor the credit which were his due. Riccioli and Grimaldi both seem to have viewed him and his labors with the eyes of rivals, and, in their notice of his valuable discoveries, for such they were, hesitated mistrust. The lapse of two hundred years has at length brought a singular confirmation of the truth of what Fontona asserted that he saw. Riccioli says, (lib. vii. sect. 1, cap. 4.)—"in the observations of Francisco Fontana, I read that Venus was seen in the evening through the telescope, oblong, and about the same apparent size as the Moon seen without a telescope, *with a rough edge on the concave part*, and sending forth rays, especially when the figure was [illegible], and (that which never hitherto has been heard of,) *with one or two dark coloured round spots, at one time beyond, at another within the body of the planet, so as to* [illegible] *the disc*, as may be seen in the subjoined contracted sketches. If these things be true, (for far be it from us to call in question the good faith of those who affirm them,) it seems that we must say, that it was either some meteor, perhaps a patch, [illegible], or belt, or some small cloud between the observer and Venus, or surrounding it; or that there are spots, like the solar spots, blown up, and, as it were bubbles from the body of the planet Venus, or like the caverns and mountains

of the Moon, more or less illuminated according to their varying position with respect to the Sun, or perhaps owing to the rotation of Venus on its axis [illegible]; for neither dare I say that Venus has satellites, until the day comes that we may reach to something more certain concerning this affair. It has never certainly been permitted for me, nor for Father Grimaldi, nor for Gassendi, as appears by the 3d book of his Institutions of Astronomy, to see in Venus, nor near Venus, those small globes (or spots) by means of any telescope."

So said the Father Riccioli two hundred years ago; remarks certainly not very encouraging to the communicators of new discoveries. But time, the vindicator, has at length done his work: and long after Galileo, Fontana, Riccioli, Gassendi, and Grimaldi have ceased from their watchings and their labors, and enjoy their rest, "unmindful of the call of the morning," the controverted points have come to be resolved:

> "*Omne*, quod optanti divom promittere nemo
> Auderet, volvenda dies, en attulit ultro."

The four delineations given by Fontana, correspond closely with the account given by the Roman astronomers, in the memoir now under discussion. In Fontana's delineation of the appearance of Venus on Nov. 11, 1645, the disc is rather more than the quarter, and has an oblong dark spot in the middle of the illuminated part; in that of Nov. 15, 1645, the disc is nearly the half section, with the ragged edge on the concave side, and dark detached spots at each horn of the crescent; in that of Dec. 25, 1645, the disc is gibbous, and has only one dark detached spot on the lower horn; in that of Jan. 22, 1646, the disc is a crescent nearly filled, and with a dark oblong detached spot right in the centre of the concave boundary.

The Roman astronomers inform us that Venus was observed by them on April 12, 1841, at six of the evening; that "the phase presented by the planet was rather small, and that near the point of the northern horn, and properly in the middle of the illuminated part, there was seen very plainly a dark oblong spot. It appeared as if a short and fine thread of black silk were placed so as to lie on that part. Whilst the usual observations were making of the diameter of Venus, the Signor Clemente Palomba, the assistant observer, to whom was entrusted the care of the instrument and of the micrometrical observations, gave us notice that to a certainty the entire disc of the planet was visible, and not merely the small portion illuminated by the sun. The magnifying power used was 120. The sun had set not long before. The thing is true, and was seen also by the others present. We have since happened to learn, that the same phenomenon was manifest to Meyer, at Griefswald, Oct. 20, 1759; to Harding, in 1806, on Jan. 24, Feb. 24, and March 28, in the morning; and lastly to Schröter, Feb. 14, 1806."

"1841, April 19.—The same appearances."

"1841, April 21, at 6 of the evening.—The spot of the northern horn appeared nearer to the limit of the shadow and perhaps was already in part immersed in the penumbra. Magnifying power 241. At 6*h* 33*m*., it was seen surrounded with very bright light. With a magnifying power of 824, it was seen to be exactly like a lunar crater, when its highest banks are illuminated from the vertex two-thirds downwards. The Signor Palomba measured the apparent diameter of Venus, first from the illuminated limbs, and afterwards from the one illuminated, and from the other dark. This last always came out less than the former."

"1841, April 22 and 23.—The same appearances as the day before. The spot seemed enlarged in size."

"1841, April 30, 7*h*. 30*m*. in the evening—The spot was very black and very clear to be seen. It was surrounded by a lucid ellipse, as the sides appear of a lunar crater seen obliquely. The limit of the dark part of the disc, although it had encroached a good deal into the interior of the spot, nevertheless did not yet cover the above mentioned bank, which with its luminous half, appeared pretty well within the dark portion of the disc. Magnifying power, 824. Towards the extremity of Venus at the opposite horn, there began to be seen, first by Signor D. V. Monti, and afterwards likewise by the rest, something similar; but the evening being too far advanced, the observations were dropped."

"1841, May [illegible].—Drawn by the curiosity of seeing the crater of Venus, besides the accustomed observers, there came divers others who had the pleasure to be satisfied. At [illegible] minutes past 8 of the evening, the [illegible] of Venus was

distinctly seen; and however the dark part appeared advanced, yet it did not cover any portion of the illuminated edge which surrounded the spot. Magnifying powers, 241 and 824."

"1841, May 3, 8h. 40m. of the evening.—The summit of the lucid border of the spot towards the dark part of Venus was no longer seen with the magnifying power of 240. With the other of 824 it was hardly seen. With less magnifying powers the dark part of the disc appeared dentellated at that point.

"At 8h. and 50m. the lucid edge of the planet was not plainly terminated by a circular curve; towards the southern horn it appeared deficient; from thence by little and little it turned to be visibly terminated in a circular curve, but between it and the limit of the dark part there was visible a very subtile but well decided and long black spot, like a slender thread stretched from one horn towards the other."

"1841, May 4, at the same hour.—The darkness had covered entirely the half of the elliptic edge of the crater; and the northern peak of it appeared terminated in a triple point. Two of those points were the effect produced by the edge of the darkness upon the brink of the crater, which was seen to penetrate with two lucid arms into the dark part. Magnifying power, 824, and afterwards 1129."

The excellence of the telescope used by Fontana is particularly noticed by Gassendi. It was this, with his own adroitness and acute vision, which enabled Fontana to be the lucky discoverer of the spots on the discs of Venus and Mars, and of the spots and belts on that of Jupiter; but it was reserved for that truly great man, Dominic Cassini, to pursue the inquiry with success, about twenty years afterwards; to assign with precision the situation of the spots, and, by calculation, to determine the periods of the rotation on their axis, for each of those planets, with wonderful accuracy. His observations and calculations for Mars and Jupiter, were at once generally admitted; but, although he was, in reality, more successful in the instance of the rotation of Venus than in that of either of the other two, for he estimated it at 23 hours, 21 minutes, which was only 22 seconds less than the truth, yet, by a strange perversity this was especially doubted, and his accuracy, and almost his veracity, called in question. He had seen the spots of Venus at Rome, but in vain tried to discover them with the telescope of the observatory at Paris. He persisted in his assertions and in his calculations; and the northern astronomers persisted in their doubts, to his great discomfort, and that of his worthy son, J. J. Cassini, who like Æneas, with becoming piety, stoutly sustained his father's good fame. But all would not do; the northern astronomers would not believe that any spots could be any where seen in Venus, for they were invisible at Paris and London. Cassini found himself in the predicament of Fontana, and the story of the man of Rhodes must have haunted his recollection.

Yet still there were intimations from time to time given by astronomers at Rome, that they did see spots as Cassini had seen them; and at last Francisco Bianchini, in 1726, gave a map of the planet and his estimate of its rotation, which he made to be nearly 24 days, 8 hours. Now the time of the true rotation, as ascertained by the authors of the memoirs now produced, is 23 hours, 21 minutes, 22 seconds; and 25 of those rotations would take up in time 24 days, 7 hours, 54 minutes, 8 seconds, so that the theory propounded by Bianchini may be regarded as a compromise offered to those opposed to Cassini. The matter remained thus in the slumber of doubt, for more than a hundred years, for the opinions of Schröter were merely an adoption of those of Cassini, although Lalande, Delambre, and Laplace repeatedly urged the necessity of constant observation in the southern observatories, for the solution of so important a problem; and it is only lately that younger men having succeeded to the direction of the Roman observatory at the Collegio Romano, and having their lives before them, the matter has been taken in hand in earnest.

The methods used have been those particularised by Delambre, combining the known orbitual movements of the earth and of the planet, with the diurnal changes of position observed in the spots. For three years the observations made have been incessant; between January 1, 1840, and April 30, 1840 they amounted to one thousand six hundred and fifty in number. Designs of the apparent discs of the planet were taken several times a day. Of these ninety-one are given with the memoir; the general map is to follow. The result of the whole is completely confirmatory of the statements and calculations of Cassini as far as regards the time of the rotation, and of the accuracy, in a great degree, of the

map published by Bianchini. The error of Bianchini in his estimate of the rotation appears to be owing to his having mistaken the return of certain spots for those of others, and to his having founded his theory on too limited a number of observations.

The following are the further results of the observations made on Venus, and of the calculations now founded on them for the year 1840:—

	Hours.	Min.	Seconds.
Rotation of Venus on its axis, ...	23	21	21.9345
Inclination of the plane of the Equator of Venus to the plane of the Orbit of Venus, ...	56	24'	24"
Inclination of the Orbit of Venus to the Ecliptic, ...	3	23	33.23
Longitude of the ascending node of the Orbit of Venus on the Ecliptic,	74	40	31
Longitude of the Vernal Equinox of Venus,	56	31	0
Latitude of ditto, South.	1	3	30
The Vernal Equinox of Venus therefore took place in space, measured on its Orbit, ...	18	11	18
Or in time before the planet in its course crossed the ecliptic, ...	11 days, 8 hrs. 30 min.		

As Venus crossed the ecliptic in her ascending node in the year 1840, on June 25, 15*h.* 10*m.*, the vernal equinox of Venus must have taken place on June 14, 6*h.* 40*m.* of that year.

SATURN AND HIS RING.

The observations on Saturn, its satellites and ring, being still in course of prosecution, in conjunction with those of Professor Schwabe, and as they will be given at large in the memoir for next year, it may suffice to state "that Saturn does not always keep the centre of the ring, but makes a small periodical movement from the centre." "That in 1840, for several nights in sequence, there was seen on the eastern point of the ring, a very small lucid point adhering immovably to the edge, so that it might be said to be one of the small satellites of the planet, that had attached itself to the limb."

"That there was on the superficies of the inner ring from time to time seen a small obscure trace like the belts of Jupiter and Saturn, but although different from that which has been considered as a subdivision of the ring, they both seem still to be of the same nature. The new division of the ring, seen by Encke, has also been visible at sundry times in Rome."

Liverpool, September 5, 1842.

BRITISH ASSOCIATION.

Mr. J. P. Joule.—"On the Calorific effects of Magneto-Electricity, and the Mechanical Value of Heat." It has been long known that fine platinum wire could be ignited by magneto-electricity; still, it remained a matter of doubt whether heat was evolved by the *coils* in which the electricity was generated—indeed, it appeared reasonable to suppose that *cold* was produced there, to make up the heat evolved from other parts of the circuit. The author has endeavoured, by experiment, to clear up the uncertainty; for this purpose, he used a small compound electro-magnet, immersed in water, revolving between the poles of a powerful stationary magnet, and the electricity given off, measured by an accurate galvanometer; the temperature of the water was carefully taken after each experiment by a delicate thermometer, to guard against the influence of caloric in the surrounding atmosphere. The revolving tube was covered with tinfoil, and every precaution was taken to secure the accuracy of the experiments, by an extensive series of which he succeeded in proving that *heat is evolved* by the coils of the magneto-electrical machine, as well as by any other part of the circuit. By turning the machine contrary to the direction of the attractive forces, so as to increase the intensity of the voltaic current, the evolution of heat was still proportional to the square of the current. By a dynamometrical apparatus, the author as-

certained that a quantity of heat capa- [illegible] of a [illegible] Fahrenheit's scale [illegible] with the magnetism, which will raise about 8 [illegible] to the height of one foot.—*Mining Journal.*

TEMPERATURE LIMITING THE DISTRIBUTION OF CORALS, BY JAMES D. DANA, ESQ., GEOLOGIST OF THE UNITED STATES EXPLORING EXPEDITION.*

I have before stated to the association, that the temperature limiting the distribution of corals in the ocean is not far from 66° F. On ascertaining the influence of temperature on the growth of corals, I was at once enabled to explain the singular fact that no coral occurs at the Gallapagos, although under the equator, while growing reefs have formed the Bermudas in latitude 33°, 4° or 5° beyond the usual coral limits. In justice to myself, I may state here, that this explanation, which was published some two years since by another, was originally derived from my manuscripts, which were laid open most confidingly for his perusal, while at the Sandwich Islands, in 1840. The anomalies which the Gallapagos and Bermudas seemed to present, were dwelt upon at some length in the manuscript, and attributed in the latter case to the influence of the warm waters of the Gulf Stream; in the former to the southern current up the South American coast, whose cold waters reduce the ocean temperature about the Gallapagos, to 60° F. during some seasons, although 20° to the west, the waters stand at 84° F. Extratropical currents, like that which flows by the Gallapagos, are found on the western coasts of both continents, both north and south of the equator, and intratropical currents are as distinctly traceable on the eastern coasts.† In consequence of these currents, the coral zone is contracted on the western coasts, and expanded on the eastern; it is reduced to a width of 16° on the western coast of America, and of but 1[illegible]° on the east coast of America; while in mid-ocean it is at least 56° wide, and about 54° on the east coast of Asia and New Holland. The [illegible] much of the usual [illegible] current, and it is, therefore, [illegible] in its effects [illegible] intratropical or Gulf Stream. We have hence the remarkable fact, that the coral zone is 50° wider on the eastern than on the western coasts of our continents. Such is the effect of the ocean currents in limiting the distribution of marine animals. These facts will be brought out more fully in the reports of the exploring expedition. The important bearing of these facts upon the distribution of fossil species is too apparent to require more than a passing remark. The many anomalies which have called out speculations as to our globe's passing through areas in space of unequal temperatures are explained without such an hypothesis. Instead of looking to space for a cause, we need not extend our vision beyond the coasts of our continents.—*Ibid.*

* Read before the Association of American Geologists and Naturalists, at Albany. From Silliman's American Journal of Science and Arts.

† The existence of these great ocean-currents was first pointed out to me by the distinguished hydrographer, Mr. William C. Redfield, who kindly furnished me with charts of the same before the sailing of the expedition.

ELECTRO-GALVANIC BLASTING.

G. R. Hutchinson, Esq., Lieut. R. E., has addressed a communication to the *Civil Engineer*, descriptive of another application of the conducting power of water, which, with the approval of Major General Pasley, he has lately adopted in firing submarine charges over the wreck of the *Royal George*, at Spithead, and which the General and himself both consider a great improvement on the mode hitherto practised. —"My attention (he says) had been for some time led to this subject in carrying on some experiments in June and July last on the relative power of different lengths of wire conductors in use over the wreck for transmitting the electric fluid. These conductors consist of two stout copper wires, separated by a 1½-inch rope; the wires are carefully insulated and paid over with tape, yarn, and waterproof composition; the rope is saturated with the same composition, being immersed in it while boiling; and yarn is then bound round the whole, with a second coat of composition over it. The apparatus used for the experiments was the voltameter—consisting of a glass vessel with inverted tubes; two pieces of platinum wire were fixed into the sides of the vessel, and bent at right angles to enter the tubes. On connecting the two ends of the conducting wires at one extremity, placing a voltaic battery at the other, and the voltameter

within the circuit, the water in it was rapidly decomposed; gas was emitted, and passed into the tubes, which being graduated with a scale divided into tenths of inches, showed the relative power of each length of the wire conductors by the quantity of gas delivered in a certain time. I was, however, surprised to find that decomposition of water ensued even when the ends of the wires furthest from the battery were disconnected; and it soon became evident, that as these wires had been frequently used for firing charges at a depth of thirteen fathoms under water, a certain degree of moisture must have been forced in by the great pressure at that depth through the exterior coating notwithstanding the precautions used to make it and the wires waterproof, and thus the electric fluid must have been led from one wire to the other, causing action in the voltameter; this became still more apparent on applying the voltameter and battery to a length of wire conductor which had never been under water—as, unless the ends of wires were connected, there was no gas emitted. There was another convincing proof of the power of water as a conductor, though it in some measure frustrated the object of my first experiments; but prosecuting the subject still further, I have since been enabled to turn this power to account, by using the water as a conductor in conjunction with a single wire for firing charges, which are daily required, over the wreck. The method of doing this will now be stated:—From Mr. Bain's experience as well as my own, it appeared, that using water as a conductor in conjunction with a single wire, a certain metallic surface must be present at each extremity of the wire, to ensure the transmission of a sufficiently powerful current of electricity; in the case of submarine explosions it would, therefore, be necessary to have one surface of metal at the bottom of the sea and another at the top, the depth of water forming the conductor between; and, as the greater part of the charges used at Spithead are in common oil cans of tin (a good conducting metal), varying from two to five gallons, it occurred to me to make use of the tin can as the metal required at the bottom, and at the surface of the water to use plates of zinc. Before lowering the charge to the bottom the single wire is connected to one of the priming or short wires inserted in the bursting tube of the charge, and the other priming wire is turned down on the tin and connected with it; the charge is taken down by a diver, who places it, and after he has come up the zinc plates are immersed (I found, by experiment, that three plates of 10 in. by 7 in. were required), connected by copper wire passed through a hole in the top of each; the end of the single wire above water and that of the short length attached to the zinc plates are led to a battery, which for firing charges in thirteen fathoms water, should have a power equivalent to six cylinders of Daniell's battery—this I found to be the minimum; on completing the circuit, the charge is fired by the transmission of the electric fluid down the single wire, igniting the piece of fine platinum fixed across the priming wires, within the bursting powder, and returning by the water, which over the wreck of the *Royal George*, completes a portion of the circuit equalling eighty feet. This method has now been so frequently tried, and without a single failure, that it may be considered as certain and secure; and I consider it superior to that of the double wires, on account of the greater liability of the latter to break, or to be brought improperly in contact, by the shrinking and contraction of the rope imbibing moisture; the saving of wire is also a great object, and the single wire may be conveniently coiled on a common log-reel, and held in the hand while being passed over the side of a vessel, when used on a wreck. This system may be used for charges contained in vessels of tin, iron, copper, or any other conducting metal; but when wooden casks are used, it would be necessary to attach a certain surface of metal to the cask.—*Ibid.*

THE SCREW PROPELLER—SMITH'S PATENT.

The complete success which has attended the application of the screw for the propulsion of vessels by steam, in every instance, induces us to lay before our readers some particulars connected therewith, and the performances of some of the ships which have during the past four years been fitted with it. Hitherto the vessels to which the screw has been applied have been of moderate tonnage, and it became a question, much canvassed among practical and scientific men, whether it would have sufficient power to answer

the expectations of the inventor in ships of extraordinary size and burthen; but the trial trip of the *Great Northern* down the river, when she accomplished ten and a half miles per hour without using any sails, has completely set the matter at rest, and proved the efficiency of the screw propeller for vessels of every size and description—and it is remarkable, that, although the propeller that has been applied to this monster ship is smaller in proportion to her tonnage than any other that has been yet fitted, her rate of speed under steam has surpassed the most sanguine expectations of all who have witnessed her performances.

The screw originally introduced into the *Archimedes* (the vessel on which the first really practical trial was made) consisted of one entire turn 8 feet in length and 7 feet in diameter; this, however, being found too large for the steam-power to drive with requisite velocity, was gradually reduced to 5 feet 9 inches—subsequently it was divided into two half turns, which reduced it to half its length, while the superfices of the screw remained the same. Various propellers tried by Mr. Smith in small experimental boats, and subsequently in the *Archimedes*, have shown that the most effective form is one entire turn of the thread; this, however, for the sake of compactness, may be divided into two half, three thirds, or even four quarter turns, which renders the propeller considerably shorter, while its useful effect is in no way diminished.

The angle which the thread should make with the shaft has been closely experimented on, and it has been found that an inclination varying from sixty to seventy degrees at the circumference has produced the best result. The circumstances, however, which would determine the precise angle between the two, as also its diameter, depend on the form and description of vessel to be propelled—for instance, if a tug or heavily laden vessel, the latter angle would be most suitable; but in a vessel of fine lines and light draught of water, the former would be best adapted in order to obtain a high rate of speed.

On starting the vessel in a dead calm, a column of water in the shape of an inverted cone may be seen thrown astern of the ship, from which it is inferred that the whole force of the screw is propelled in the direct line of its axis, while that of paddle-wheels is partially lost in entering the water and raising it considerably above the level on leaving it, which produces the swell so much complained of in river steamers. The position of the screw is in the dead wood immediately before the rudder, the keel being continued along underneath it. One great advantage of the screw being placed in this position is, the transferring the whole weight of the propelling apparatus from the top sides of a vessel to the lowest part of the hull; and in the *Great Britain* (of 3600 tons), recently launched at Bristol it has been ascertained that in applying the screw, instead of paddle-wheels, as originally intended, 100 tons of superabundant weight have been removed from her upper works—a circumstance of immense importance to the safety of the ship when labouring in a heavy sea. The engraving plate 34, Fig. 1. shows more clearly the principle and situation of the screw propeller:—

DESCRIPTION.

A—The thread or worm of the screw.
B—Screw shaft.
C—The opening or space in dead wood.
D—Propeller shaft.
E—Solid stern post.
F—Dead wood of the vessel.
G—Iron or metal knees, which carry the propeller.
H—Stuffing box, through which the shaft passes to the engine.

As the speed obtained by the Archimedean screw is, perhaps, one of the most important points under consideration, we will now proceed to give some particulars of the performances of those ships which have already adopted it.

SUMMARY OF THE PERFORMANCES OF THE "ARCHIMEDES,"

(237 tons, 70-horse-power.)

May 14, 1839.—Made the passage from Gravesend to Portsmouth in twenty-one hours, against a strong westerly breeze.

October, 1839.—Beat the Hon. East India Company's steamer *Queen*, of 220-horse power, upwards of three quarters of a mile in a run of eight miles.

April 18, 1840.—She was ordered to Dover for the purpose of trying her powers with her Majesty's packets at that station, on which occasion the fastest of them, the *Widgeon*, was beaten nine minutes between Dover and Calais, and five minutes on the return trip, which was done in one hour and fifty-three minutes—being the quickest passage ever made between England

and France, by fourteen minutes. The Dover boats vary from 70 to 90 tons less, their engines from 5-horse to 10-horse power more, and the draught of water from four to five feet less than the *Archimedes*.

June 5.—Ran from Milford to Liverpool (200 miles) in nineteen and a half hours. Surpassed the swiftest boats on the Mersey; and on one occasion beat to windward up that crooked river with as much facility as an ordinary sailing ship. From Liverpool to the Isle of Man she beat the *Mona's Isle* packet (a vessel of superior power) nearly two hours—running the distance of seventy miles in seven hours and fifteen minutes.

August, 1840.—She performed the passage from Plymouth to Oporto in sixty-eight and a half hours, and the homeward trip between those places in eighty-eight hours, with wind a-head nearly the whole distance.

November, 1841.—During her passage from Bristol to London, made headway at the rate of three and a half knots per hour against a tremendous sea, whilst other steamers of much larger power bore up, as shown by the pilot's certificate.

(COPY).—"This is to certify, that the *Archimedes* made her passage from off Ilfracombe to Lundy Island at the rate of three and a half knots (as proved both by Massey's patent log and the common log), against a perfect gale of wind from west-north west, with a heavy head sea on the whole distance; also, that I have very frequently been in paddle steamers of a much larger class that could neither be made to go a-head at all, or even be kept head to wind under similar circumstances of weather. (Signed) JOHN RAY, Trinity Branch Pilot."

"PRINCESS ROYAL."

(Steam-tug boat, on the screw principle, 45-horse power.)

After beating the fastest of that class of boats on the Tyne, performed a passage from that river to Brighton in forty-eight and a half hours, a distance of nearly 400 miles. She has towed out of Shoreham harbour, at one time, two large brigs, against the wind, and tide setting in, at the rate of four miles per hour; on another occasion, towed out a brig, which carried away both topmasts immediately the steamer had cast off. This little vessel, also, went to sea with comparative ease, whilst the *Dart* steamer, of 120-horse power, was more than half an hour before she could accomplish the same object, owing to the sea and tide running at the time.

"THE GREAT NORTHERN."

EXTRACTS FROM HER LOG.

Sunday, Dec. 25, 1842.—8h. 15m. Weighed anchor in Cowes Roads, and put the ship on her course for London, under steam and canvas. 9 50 a. m. Massey's log put overboard; revolutions per minute of engine, 18; rate per common log, 10 knots; Massey's log, 10¼ do. 11 50 a. m. Stopped engines abreast of the Ower's light-ship, and disconnected the screw; ship put on her course up channel, with sails only. Noon. Fresh breezes and cloudy. 2 30 p. m. Abreast of Beachy Head; ship brought to her course. 5 5 p. m. Abreast of Dungeness; wind squally, with rain. 5 15. Massey's log hauled in. (Note—The distance run from the Ower's light-ship, by chart, sixty-six nautical miles, in five hours and two minutes.) Hove to, and fired guns for a pilot. 5 50 p. m. Took pilot on board; wind increasing. 7 50 p. m. Anchored in the Downs in eight fathoms water.

Monday, Dec. 26.—4, a. m. The wind blowing a gale, down royal and top-gallant yards. 8 50. Changed pilots. Noon. Gale increasing, and a great number of ships running for the Downs. Midnight. Weather about the same.

Tuesday, Dec. 27.—9 a. m. Gale suddenly moderated; steam raised to assist in getting the anchor. 11 40. a. m. Got under weigh, and proceeded through the Downs, setting fore and aft sails. 2 30 p. m. Abreast of Margate; took in all sail, wind being directly a-head. 5 17 p. m. Abreast of the Nore light. 6 p. m. Anchored nearly opposite the Chapman beacon.

Wednesday, Dec. 28.—7 a.m. Got under weigh, steaming only; wind a-head. 9 5 a.m. Stopped off Gravesend and changed pilots. 9 17 a.m. Started for London against ebb tide and light wind. 12 a.m. Abreast of Woolwich. 12 20 p.m. Arrived at Blackwall, and moored ship, having stopped six minutes in Longreach to adjust machinery, thus accomplishing the run from Gravesend to Blackwall (twenty-one miles) in two hours and fifty-seven minutes, the mean rate of the tide being taken at two miles per hour.

Since the *Great Northern's* arrival a

Blackwall, considerable improvement has been effected in her engines, by Messrs. Miller and Ravenhill, which was satisfactorily shown in her trials on the 11th instant, in the presence of a large party of gentlemen connected with science and the shipping interests. We subjoin the following particulars of her dimensions :—

	Ft.	In.
Extreme length	247	0
Extreme breadth	37	0
Length between perpendiculars	222	0
Depth in hold	26	5
Draught of water	18	0
Diameter of cylinders	5	8
Length of stroke	4	6
Immersed area of mid section	542	0
Area of screw-propeller	75	0
Diameter of screw	11	0
Length of screw	5	10
Pitch of ditto	14	0
Length of mainmast	90	0
Length of mainyard	79	0
Diameter of ditto	1	10½
Length of foremast	83	0
Length of mizenmast	61	0
Spread of canvas	6700 yards.	
Burthen	1515 tons.	

It will be seen from the preceding extracts from her log, that the *Archimedes*, though not built for extreme speed, but more to show the practicability of uniting sailing and steaming qualities in one vessel, has succeeded in beating many vessels of superior power, built expressly for steaming. Her utmost speed under steam alone was nine and a quarter knots an hour, under sails alone nine knots ; with steam and sails combined, under the most favourable circumstances, it was upwards of eleven knots. This is particularly worthy of consideration, as showing the utility of a moderate steam-power on board sailing vessels in case of calms or contrary winds, while the expenditure of fuel need not be resorted to during favourable winds merely for the trifling gain above stated. Upon twenty out of thirty-two points of the compass a ship would be able to dispense with her steam-power altogether.

The great superiority of the screw is most apparent in causing the ship immediately to answer her helm ; the stream of water thrown astern by its action keeps the helm steadily amidships, and the slightest movement of the wheel is sufficient to govern her. In turning about, the effect of the screw is surprising ; on the *Archimedes* putting the tiller hard over, she performs a complete circle in two and a half minutes, and a second circle in two and three-quarter minutes—the rudder acting as a drag on the stern, it takes longer time to make a second circle than the first, yet the space occupied is less, until the vessel seems to turn on a pivot—an entirely new manœuvre in navigation.

In concluding this notice of an invention which is likely to effect so great a change in our present system of navigation, the advantages to be derived by its adoption may be summed up as follows—namely : Less original cost of building a vessel, by at least 20s. to 25s. per ton ; a saving of at least 50 per cent. in fuel, owing to the frequent use of sails in lieu of steam, and a consequent increase of available space for cargo or other accommodation ; less wear and tear of machinery, in proportion to the time when not in operation, and, when in use, less liable to accident, owing to the peculiar position and uniform action of the propeller, as compared with the paddle-wheel. Ships of war will, sooner or later, find its use indispensable, to render them more capable of defence against the host of steamers building in various parts of the world—the screw admits of the machinery being placed entirely under the water line, and consequently secure from gunshot or other casualties in action. Merchant ships may avail themselves of the means of locomotion at a comparatively trifling expense, and the longest voyages may be effected with a degree of certainty and punctuality which has not hitherto been accomplished. In riding out a gale, the propeller has been found of the greatest use—by moving the engine at a slow rate the strain upon the cables may be most materially reduced, and the bow of the vessel rendered more lively in consequence ; in heaving to, it frequently happens that the stoutest canvas is blown into ribands, in which case the vessel generally becomes unmanageable and at the mercy of the waves—in an emergency of this kind, the propeller, from its extraordinary effect upon the helm, would enable those on board to keep the vessel in the best position for her general safety. In driving head to wind the paddle-wheel is often immersed above its axis, and the engine thereby brought almost to a stand still, during which time the way of the vessel is rather impeded by it than otherwise, whilst in another

instant the wheels are flying round at a fearful velocity, from the trough of the sea having left them nothing to work upon, save the howling winds of the monsoon—in the one case where the greatest amount of power, is required, a tithe of it only can be said to be in operation; on the other hand, a surplus of power is exhausted, without producing the least effect upon the vessel, except that of straining her whole frame when next it comes in contact with the thrashing waves. It is, therefore, only at intervals that the ship can regain sufficient momentum to be strictly under command of her helm. Numberless instances have occurred where the most powerful steamers have become totally ungovernable from this cause, and there can be but little doubt that the loss of the ill fated *President* may in a great measure be attributed to a similar source; it is also a well known fact that the *British Queen* during the same gale, laid for several days in a most helpless state, owing to the total destruction of her paddle-floats. This evil, which is inseparable from all paddle fitted vessels in rough weather, is entirely obviated by the screw propeller, from its being but little affected either by the rolling or pitching of the ship, and from the circumstance of the engine being at all times capable of driving the screw up to fully two-thirds of its maximum rate in a calm; the motion must, therefore, be more constant, and a more uniform pressure kept upon the vessel. No fear need be entertained of her falling into the trough of the sea so long as the screw is in operation, as the stream of water thrown by it on each side of the rudder is at all times sufficient to place the vessel in the most desirable position.

However beneficial the application of the screw may be to sea going vessels, it strikes us as being by no means less so for the purposes of river and canal navigation; the huge paddle-boxes now in use not only destroy the symmetry of the most beautifully formed model, but monopolise the principal share of a crowded navigation, to the annoyance and risk of all that come in their way. Divest a steamer of her paddle-wheels, and one half the space will suffice for her accommodation.

We have selected the above as being some of the most important advantages that have been practically demonstrated by the different ships and vessels which have been fitted with Mr. Smith's propeller, and, as far as we are able to judge, the time cannot be far distant when every merchant ship and man of war will have it fitted with its steam-engine, as an adjunct of locomotion when their lofty masts and canvas are of no avail. We cannot but express our surprise at the tardiness of the British Admiralty in adopting the screw propeller, more particularly as our neighbours, the French, have for some time past determined on introducing it generally in their navy; and if they should succeed in producing many as beautifully modelled vessels and as efficient in point of speed as the *Napoleon*, which recently accompanied the Prince de Joinville to England, our builders will have less to boast of than in former times. We are, however, glad to find that the *Rattler*, which has been built by the Government for the express purpose of testing the properties of the screw in comparison with the paddle-wheel, will shortly make her first experimental trip; and we have no doubt, from what has been previously done by other vessels on the screw principle, that her success may be considered as certain. The number of vessels fitted, and that are now fitting, with the screw propeller in different parts of the kingdom amounts to fourteen.

NEW LIGHT—SUBSTITUTE FOR GAS.

A highly-interesting experiment with the galvanic light, proposed by M. Archereau as a substitute for that of gas, was made a short time since, on the Place de la Concorde. The intention of making this experiment having been announced by the public press, several thousands of persons had assembled to witness it. The light exhibited appeared to be about an inch and a half in diameter, and was enclosed in a glass globe of about twelve inches in diameter. In the first instance, the gas lights of the Place de la Concorde, which are 100 in number, were not extinguished. The appearance of those nearest the galvanic light was quite as faint, and had the same dull hue, as the ordinary oil-lamps when near a gas-light of the full dimensions. When the gas-lights of the place were put out, the effect of the galvanic light was exceedingly brilliant, eclipsing even, in the opinion of many persons present, that of the hydro-oxygen light. It was easy to read small print at the distance

of 100 yards, and it was only necessary to look at the shadow of the objects in the way of the light to be convinced of its great illuminating power. The single light exhibited did not replace the whole of the gas-lights which had been put out, but we may fairly estimate it as equal, at least, to twenty of the gas-burners of the Place de la Concorde, where they are larger in volume than in most of the other parts of Paris. It would, therefore, require five of these galvanic lights to light the whole of the place; but the rays of these five lights meeting each other, would, in all probability, give a much more intense light, to say nothing of the superiority in softness of colour, than the present gas lamps. That the substitution of the galvanic light for gas-light would be a great improvement there can be no doubt, and we imagine that the expense of renewing the supply of the galvanic battery by which the electric fluid is conveyed to the burner, and then thrown upon the charcoal which becomes thus brilliantly incandescent, would not be so great as that of the generation of gas.

POTTER'S PATENT ANCHOR.

Among the innumerable machines which have from time immemorial been constructed for the convenience or safety of mankind, not one, perhaps, has undergone so little change or improvement as the anchor. When first vessels began to be constructed sufficiently large to venture far out to sea, the early mariners found something was required to keep a vessel fast in storms and contrary winds—the first thing which suggested itself was a large iron hook to hold to the ground; by making this hook double, with a cross-piece at the top of the shaft, the anchor was formed, and such it has remained. Thousands of years have passed away since its first construction, and yet, with the exception, perhaps, of ascertaining its best proportions, and widening the flukes, this primitive implement has been handed down from generation to generation—honoured for its very antiquity, and sternly bidding defiance to ingenuity and perseverance to effect, or even attempt, an alteration. True is it, that within the last half century attempts have been made to supersede the old form of anchor by other inventions, but all of which have proved unsuccessful, and it was reserved for Messrs. Potter, of the Dunston Anchor Works, Gateshead, to introduce an alteration in the ancient machine, which has produced a complete revolution in the manufacture of this necessary instrument—combining greater strength and safety, less weight, and far greater convenience of stowage. The patent anchor differs from the common one in several particulars; the shank, instead of being a rounded shaft, or approaching to that form, resembles a rectangular beam, deeper in the middle than at the extremities; the arms are forged in one separate piece, and bolted through, in a groove, at the lower end of the stock—thus enabling them to vibrate on a centre. The flukes are of a gradually tapering form, swelling out from the arms and ending in a point, and furnished at the back with a spur, which performs a prominent part in its action of penetrating the ground. Figs. 1, 2 and 3, Plate 33 show the anchor in the three different positions it assumes after being canted until entering.

Fig. 1 is the position of the anchor when first canted, resting on the lower spur, while the upper arm is nearly perpendicular. Fig. 2 shows the first motion of the tackle, which has brought the point of the fluke to the ground, and in a position to enter it, as the shank is advanced; and fig. 3 shows the lower arm in the ground its whole length, while the upper point rests on the shank, adding materially to its ability to resist either continued pressure or sudden shocks; they act on the principle of, and resemble, a gothic arch; they are curved while the iron is in a heated state, thus securing the best cohesion of its particles, while the breadth and thickness of the flukes, and the horn at the back adds greatly to the strength of the arms. In order to prove the superiority of the patent over the old anchor, every means have been resorted to which ingenuity could devise—not only in testing its strength by powerful weights and by the hydraulic machine, but the mathematical formulæ which regulates its action has been carefully investigated, and each case proves its principles to be perfectly correct. From the many experiments for testing its strength which have been performed, it appears that the permanent set, on a large anchor of 80 cwts., when exposed to a weight of 106 tons, would not exceed the 189-1000 part of an inch. The following table shows the comparative strength of the old and the patent anchors, from actual experiment:—

Weight of anchors.	Tests of common anchor.	Patent anchor.
10 cwts.	12· tons	21·5 tons.
17 "	18·25 "	31·28 "
26 "	25·625 "	47·475 "
53 "	44·25 "	79·65 "
81 "	59· "	106·2 "

Dr. Alexander Jamieson, in a report on the mechanical properties of Potter's Patent Anchor, mathematically demonstrates its powers, and, by a series of diagrams, explains its principles. As the strain on any section of the fibres, or particles, of a body is greater, as the leverage with which the force acts is greater, and less as the leverage is less; and as, in the patent anchor, the leverage is less than in the common anchor, by the whole length of the arm, so the strength must vary in the same proportion. It is proved from data, supplied officially from her Majesty's Dockyard, at Woolwich, that the strength of the patent, in proportion to the common anchor, is as 81·5 to 45; therefore, if the registered proofs of anchors in the Admiralty records be multiplied by 81·5÷45, or 1·8, the products will be the proof strains of Potter's anchor, the proportions of which will be found in the above table.

The following diagram (fig. 4) will give an idea of the mathematical action of the anchor, considered as a bent lever—which it actually is. When it first reaches the ground, it disposes itself as A B, B D C, B D' C'; having no tendency to enter the ground, the point C being turned upwards, and the point D serving as a fulcrum for the lever A B, B D. When the shank at A has been forced forward to A', the end on which the arms move has passed over the arc B *b*, by the lever B D turning on the point D; in this position the point C, which was originally pressing on the shank, is now on the ground at *c*, where the penetration is to take place, and the anchor is now in the position A, *b*, *b* D *c*, *b d' c'*. Again, when the shank has moved from A' to E, the end to which the arms are attached has described the arc *b* B, by reason of the lever *b c* turning on the fulcrum *c*, and is now in a position to enter the ground, which it must do on the further advance of the shank from E, while the extreme point of the upper arm is pressed firmly against the shank, assuming the appearance, as described in fig. 2.

It is now four years since the anchor was first laid before the public; it is employed on board about seventy vessels in the Royal Navy and 1100 merchantmen, while many ships in the navies of France, Russia, Holland, Naples, and Portugal, have been fitted with it; and, from innumerable testimonials from the commanders, it is evident that it is impossible to foul it when in the ground. It cants and bites quicker, and with more certainty, than any other—has extraordinary holding powers—holds on to the shortest stay peak—presents no upper fluke to injure the vessel or others in shoal water—is most convenient for stowage, and possessing the very maximum of strength with much less weight—the resistance being more equally divided over the shaft and arms.

We have thus, at considerable length, endeavoured to describe the patent anchor, and explain its properties, from a conviction of the value of the invention, and feeling assured that so eminent an improvement in an article of such vast importance as the anchor, on which often not only the safety of a valuable cargo, but hundreds of lives, depend, must be considered worthy of serious consideration; and is not only of moment to the patentee and ship-owner, but becomes, to a considerable extent, a national subject, connected as it is with our "Wooden Walls"—those tried and never-failing bulwarks of England's greatness.

THE "PENELOPE" STEAM FRIGATE.

It will be remembered that this is the frigate on which the experiment has been tried, of cutting in half a large vessel, and lengthening her to any extent required—the history of this proceeding is interesting. It appears that about the year 1782 a frigate called the *Blonde* was captured from the French, and afterwards named the *Hebe* in our service; from her excellent sailing qualities, this vessel obtained a celebrated name for speed, and several frigates of her class were built upon her lines. On the general survey of the navy, in 1815, it was decided that eighty frigates should be the constituted number for the navy, and that they should be of the class, and on the lines, of the *Hebe*. In 1831 there were no less than fifty-four of this class built and building, when, in 1832, Sir Thomas Hardy pointed out to the Admiralty that ships of the *Hebe* class would no longer be efficient, as they were only 18 and 24 pounder frigates of thirty-eight guns,

while foreign vessels were 32 and 42 pounder frigates of sixty guns. The *Hebe* class was then ordered to be struck off the list, those building to be altered to larger class, and all in future built to be of the same size. By this arrangement there are now lying in ordinary at Portsmouth thirty-four frigates useless to the service, and some in good repair, which have cost the country 1,000,000*l*. In 1838, Mr. Edye, the assistant surveyor of the navy, submitted his plan for increasing the size of these vessels, and converting them into war steamers; the proposal was received well, but was considered from year to year, when at last the *Penelope* was selected for the experiment; she was lengthened sixty-three feet, and fitted with engines of 700-horse power, as soon as the *Penelope* was ready for sea, she was ordered to the Downs to join the squadron of steamers in attendance on her Majesty, to test her capabilities and powers of speed.

At this time she had on board, in addition to her heavy engines, 500 tons of coals—a crew of 330 men, with six months' provisions—and seventy tons of water and twenty-six guns—viz., two pivot guns, 85 cwt. each, ten 42-pounder carronades, two 24-pounders, and two 18-pounder howitzers, and on the main-deck ten 68 pounders of 65 cwt. each with shot, shells, and engineers' and other stores, exceeding the proposed tonnage by 143 tons, and giving her nine inches more immersion than was intended, which was intentionally done to try the ship at her deepest draught, 19 ft. at the bows, and 20 ft. 3 in. by the stern. Her expenditure of coals, provisions, &c., will lighten her three inches per day; notwithstanding these disadvantages, she made ten and a half and eleven knots, or about thirteen miles per hour, beating the whole of the squadron—the *Victoria and Albert* yacht being the only vessel which had the advantage of her in speed. She answers her helm at the slightest touch, steering easily as a boat, and while the other vessels were rolling in a heavy sea, from 15° to 20°, a glass of wine full to the brim was placed on the gun-room table, and not a drop was spilt. It was considered that the bluff formation of her bows would retard her speed; experience, however, shows that [illegible] answer admirably [illegible] when [illegible] engines. She is spoken of in the highest terms, and is evidently a most successful experiment, and highly creditable to Mr. Edye. She has an apparatus for disconnecting her engines, and while at Cork will have an opportunity of testing her sailing capabilities as she carries nearly as much sail as when a sailing frigate. It is understood another frigate is to be altered in the same manner forthwith.

PROFITABLE PATENT.

It is a curious fact in scientific discovery that the most profitable invention that was ever patented in this or any other country accidentally arose out of an application to Government to admit sugar for agricultural purposes. The Government applied to Mr. Howard, the accomplished chemist, brother to the late Duke of Norfolk, to try some experiments for the purpose of ascertaining if sugar could be so effectually adulterated that it could not be again converted for culinary uses. For this purpose he mixed all kinds of noxious materials with it, and the question remained whether they could be again separated, and in the experiments to ascertain this, he discovered that not only could they be separated, but that the sugar was better and purer. Out of this arose Howard's patent for sugar refining and the use of the vacuum pan; the annual net income of which, from licenses granted for its use, at the rate of 1s. per cwt., yielded in some years between 20,000*l*. and 30,000*l*. One house in London alone paid 4000*l*. per annum.

ARMSTRONG'S HYDRO-ELECTRIC MACHINE.

Description. Plate 34, *Fig* 2.

A—The Boiler, made of rolled iron plate, 5-8th inches thick.

B—Fire door.

C—Ash pit.

D—Water guage.

E—The feed valve, to attach a force pump to.

FF—Tubes which convey the steam to the cross tubes, G G, into which are inserted forty-six curved condensing pipes, H H, at the ends of which jets the stream issues into the atmosphere. The jets consist of brass sockets, enclosing short tubes of partridge wood, in which the steam and water swept out of the condensing pipes is subjected to intense friction.

I I—Boxes covering the exide valves which are opened and closed by the handles projecting at K K.

L—The safety valve, the steam from which blows up the chimney, P, which is furnished with a sliding funnel, so that when the machine is put in operation, the funnel may be raised, when the boiler standing on the glass legs, O, is completely insulated.

M—The indicating valve.

N—Jet for the ball experiment.

The following brief sketch shows the power of this instrument, and some of the interesting phenomena resulting from it :—To charge a battery consisting of eighty square feet of coated surface in the space of fifty seconds with the largest plate electrical machine known, requires the power of two horses —whereas, the hydro-electric machine charges, and (by the aid of a self-acting grain-beam discharger) discharges, a battery of similar dimensions no less than six times in thirty seconds, or at the rate of 960 square feet per minute. Hydro-electricity is identical with the electricity produced by the plate machines and the other usual modes of obtaining it, and is capable of producing all the old, though nevertheless amusing, experiments which are usually exhibited, as well as many of a novel and highly interesting character —such as, the immediate ignition of wood shavings, and the instantaneous firing of loose gunpowder, by the direct action of a shock from the boiler; also, the decomposition of iodine of potassium, &c., which last phenomenon has created considerable sensation in the chemical world—and analogous results are anticipated.

In a former number we adverted to the beautiful experiment of the artificial "aurora borealis," which is produced by allowing a stream of electricity to pass upwards from the earth, through an exhausted glass tube, about four feet in length. The electricity, in its passage, frequently assumes a spiral form—a phenomenon never before observed, and which is supposed to result from the great density, or intensity, of the electricity.

Eggs, placed in a row, are beautifully illuminated on a current of electricity being passed through them. And a very pleasing experiment, termed the "electrical palm," is produced by attaching a number of strips of paper, about four feet long, to a metal rod, which is insulated; and as soon as a metallic connection with the boiler is effected, each strip extends itself in all directions in search of negative electricity, to supply the place of that abstracted from it.—*Ibid.*

EARL OF ROSSE'S GREAT TELESCOPE.

Extract of a private communication from home.

Amongst other items of intelligence, worthy of mention, I may report that the operations connected with the mounting of the Great Birr Telescope, are progressing in a most satisfactory manner. From all that I can learn there is every probability that this noble instrument will be in use by the beginning of the next year.*

The perfect success which has hitherto marked every step of the undertaking led to an anticipation, not a very reasonable one, that it would be brought to a conclusion in the autumn of the present year. In this perhaps "the wish was father to the thought."

There is yet, however, much to be done; more indeed than I am well able to describe; but looking back at what has been done and the ability of the noble mechanic who superintends, little or no fear is felt, that all will be accomplished by the time I have named. The Dublin Literary Journal states the following to be the present position of the work:

"The large tube fifty-two feet long is fixed between the walls; the castings are all made for raising or lowering the tube to the position required. The tool for grinding and polishing the speculum is put on a large lathe to give it the proper figure and for giving the final grinding and polishing. The galleries for observation are nearly completed. The telescope will be completed and fit for use about the end of the year."

I believe I am nearer the time than this, so read March or April, 1844.

NEWLY INVENTED SHOT.

Some novel experiments with cylindrical shot were made last week on the sands adjoining the Rimrose Hotel, Bootle. They were all filled with combustible matter, similar to the rocket, and fired from a piece of ordnance. At the range of 1000 yards or more they would be found most effective against cavalry or infantry, setting fire to magazines, shipping, &c. The cylindrical form is much better adapted than the spherical for live shot or shells, the bulk and weight being increased nearly one-half,

* Dated November, 1843.

the usual windage entirely prevented, and the requisite charge of powder much reduced. The shots were prepared at the foundry of Messrs. Fawcett and Co., and are for a foreign Government.—*Liverpool Mercury.*

METALLIC RELIEF ENGRAVING.

The following is given by a correspondent of the *Athenæum*:—Take a tablet of plaster of Paris, and, having heated it, apply wax for absorption to all the faces, save that on which you intend your drawing to be, and to that one apply your drawing, executed with lithographic ink on lithographic transfer paper. Let the side of the tablet on which is the transferred drawing be now dipped in weak acid and water, and then permitted to absorb a solution of sulphate of copper. By electro-metallurgy a deposition of copper can be made on all parts stained with the sulphate. Ere this coating be too thick, let the tablet be removed from the vessel in which this last operation has been carried on, washed, and carefully dried and a mixture of isinglass and gin be poured on it; its redundancy be gently blotted off with blotting-paper till the surface be level (*i. e.* the copper lines and isinglass cement be both of the same height): again, let the deposition take place, and again its succeeding operation; after which let common black lead be rubbed over the whole surface; and the deposition being renewed, a copper mould, from which a type metal block may be subsequently cast, is now formed. Another method —Draw with a pen dipped in warm isinglass colored cement, and when your drawing be dry, for an instant expose it to steam, and then coat it with leaf gold. Proceed by electro-metallurgy, as in last method, and no cast is necessary. [We doubt the efficacy of both these methods. Indeed cannot see by what analogy, with other processes, they are to succeed. Such, however, is the very general accuracy and care taken by the editor of the *Athæneum*, to insert only what is at least plausibly scientific, that we have ventured to insert the paragraph.—ED.]

A LEVIATHAN PROJECT.

We see, by a Liverpool paper, that a Lieut. Morrison has published a description of a large steam-vessel, invented by himself, to be named the *Leviathan*. She is to be 32,000 tons burthen; to be propelled by three Archimedean screws, 800 horse-power each; length of deck, 600 feet; breadth 174 feet; number of private cabins, 1,000; extent of the grand saloon 15,000 square feet, 100 feet long by 100 wide, and 15 feet high; complement of seamen and passengers, 5,650 persons. Estimated cost of building, £150,000; fitting up, £50,000; total, £200,000. Estimated gross receipts for five summer voyages to America and back, £200,000; expenses per annum, £70,000; profits to proprietors, £130, 000 yearly. The great area of each of her decks will be 140,400 feet, being much beyond the extent of two acres. There will be a promenade around the upper deck of more than one-third of a mile, calculated for horse and carriage exercise. There will be flower and kitchen gardens, conservatories, &c. extending over 750 square feet; the whole of the rest of the immense area of the decks being free for promenades, tents, seats, alcoves, &c. as there will be neither mast nor funnel on deck to interfere with the comforts of the passengers, or check the speed of the vessel. The cost of a best cabin, including table, will be but £15 15*s*. The vast extent of this floating mass will prevent all violent motion, and so prevent *sea-sickness*. The *Leviathan*, being propelled by a power of 2,500 horses, with *side*-sails, which will extend 8,800 square feet of canvas, will, on a steady average, progress at the rate of 12 miles an hour; and so reach New York from Liverpool in *ten* days. To avoid *ennui*, and render the voyage agreeable, the vessel will be provided with a theatre, to contain 1,000 persons, and a regular company will be attached to the ship; also a scientific lecture room, with apparatus and lectures for the benefit of the passengers; and there will be a series of shops, as drapers, booksellers, confectioners, &c., and a daily paper printed on board. The *Leviathan* will consist of *three* iron-built vessels, 600 feet long each. and 58 wide, which will give for each a tonnage of 10,725. These three iron bottoms are to be joined together, and a platform to combine the area of all their decks will form the lower deck of the vessel.

HOW TO MAKE A CHEAP VIOLIN.

When we see violins of the old masters—Steiner, Amati, or Stradivarius—which are called by the names of the makers in the same way as we speak of a Claude or a Titian, it is natural to inquire wherein consists the dif-

ference between those instruments and others of more modern date; the dimensions are the same—so is the form, and so is the general mode of arrangement, and yet the tones of the old instrument are eminently superior to those of modern construction. The most general opinion appears to have been that the wood of which the old violins were made has acquired a resonant or vibrating character by age, which newly-made instruments do not possess. The construction of the violin was never, however, taken up in a scientific point of view until a few years back, when M. Savart, a distinguished natural philosopher of France, investigated the sources of sound, as connected with the violin, in order to determine what were and what were not essential parts of the instrument.

One of M. Savart's first inquiries was, whether the curved undulating form of the surface of the violin is necessary to the beauty of the tones, and the manner in which he tested it was this: when fine dry sand is sprinkled on a vibrating surface, the sand is generally thrown into symmetrical forms being collected in greater quantity at certain places where the vibration is not going on, and being thrown off those portions which are vibrating with most energy. Savart sprinkled some sand on the surface of a violin, and found that during the act of playing on the instrument much of the sand remained undisturbed, thereby showing that those parts failed to contribute to the sonorous effect. Both reasoning and experiment combined to produce an opinion that the curvature of the surface was a detriment rather than an advantage. He therefore began to construct his violin by providing flat surfaces or tablets, instead of curved; and in order that the surface on each side of the strings should have equal vibrating power, he made each tablet of two pieces, cut in parallel slices from the same plank, and glued together at their edges. As the strain is greatest under the strings, he made that part thicker than the edges, the latter being about 1-12th and the former about 1-5th of an inch in thickness.

The next part to which he directed his attention was the bridge; and in order to discover what purpose it served besides supporting the strings, he made the following experiment:—along a thick plank he stretched a musical cord, fastened at the two extremities, and elevated from the plank by a bridge, as in the violin. The bridge rested on two little feet, as in the ordinary construction, and was separated from the plank by a circular disc or plate of lead. On this plate sand was sprinkled, and the string was then played by the bow as usual, when the sand immediately formed itself into a symmetrical figure on the leaden plate. This showed that the vibrating motion which the bow gave to the string was communicated to the bridge, and by means of the two little feet, to the leaden plate on which the bridge rested; and analogy showed to Savart that it must be mainly by means of the bridge that the body of the violin is set into a vibratory state when the strings are vibrating.

The question now arises, in what way is the vibration of the upper surface or face of the instrument communicated to the under surface or back? All violin-players know that a little wooden peg or post which is placed within the body of the violin has an important influence on the tone; this peg is called the *sounding-post*, or, as the French term it, the *soul* of the violin; and it has been frequently supposed to act merely as a support to the upper surface. Savart found, however, that it acts as a communicator of vibrations. If we place one end of a poker on the lid of a vessel containing boiling water, and the other end between the teeth or close to the ear, we shall hear the sound of the boiling with great distinctness, in consequence of its being conveyed through the solid iron more readily than through air: the sounding-post acts an analogous part by conveying to the lower surface of the violin the vibrations which have been excited in the upper. This being the case, it is important to choose the best place for the sounding-post, because some parts of the surface do not vibrate so powerfully as others, and therefore would not convey a vibratory action to the lower surface so readily as other parts, if the post were fixed at the former. We shall return to this presently.

In the violin which M. Savart examined, he found a bar, called the *bar of harmony*, running down the inside of the upper surface from end to end, and acting as a strengthener or support to it. This bar did not run down the middle immediately under the strings, but a little on one side, under the left foot of the bridge; while the sounding-post was under the right foot. Now

this rigid bar gives an unequal elasticity to the two halves of the upper surface, as it loads that half to which it is attached with a weight from which the other half is exempt; and as Savart wished to equalize the elasticity as much as possible, he placed his bar down the middle or thickest part of the upper tablet.

No doubt many a young violinist has wondered what is the use of the two crooked holes in the surface of the instrument, and whether there is any particular virtue in an italic *s*, that that form should be chosen for the holes. Savart found that when he pasted thin paper over these holes, the sound of the instrument was much enfeebled, and he therefore concluded that they act the same part as the hole in the side of a large drum, that is, establish a communication between the air which is vibrating within the instrument and the external air; still he could see no reason why they should be fancifully curved, especially when it is obvious that a greater number of fibres must be cut through than if the holes were straight and in the direction of the grain. He therefore cut the holes or openings according to the latter plan.

It is known that a violin will yield some tones more easily and more brilliantly than others; and Savart conjectured that this might be due either to the curved form of the surface, by which some of it was non-vibrating, or to the position of the sounding-post, by which it was situated at a nodal or quiescent point during some tones; for we may here remark, that sand sprinkled on a vibrating body assumes different figures during the production of different tones. As the air-holes or openings were free to vibrate with much facility in Savart's violin, he placed the sounding-post very near one of them, so that it should be the means of communicating energetic vibrations from the upper to the under tablet.

The next circumstance to which M. Savart directed his attention was the shape of the body of the instrument. This, we know, is curved in a complicated manner, for besides the general bending round the whole instrument, there are two deep hollows cut, one on each side. It appears that these hollows enable the player to draw his bow across the highest and lowest, or the two extreme strings, without touching the others; and if no injury were done to the tone, all this would be well. But M. Savart thought that the sides of the violin were rendered almost incapable of vibrating by this complex curvature; for the bending which the wood experiences before it can assume the required form gives it very unequal elasticity in different parts; he therefore resolved to do away with these curvatures altogether, and he made his violin with straight sides, the length being about equal to that of ordinary violins, and the width being greater near the end than near the handle or neck. By this construction the instrument was deprived of the facility for playing the exterior strings, which the side-hollows usually afford; but Savart obviated this inconvenience by making the bridge higher than usual, so that the bow could act upon the E and G strings without touching the edge of the violin.

By the straight form which he thus gave to the sides of the instrument, he insured the co-operation of the sides in the general vibration of the whole instrument, and thus increased the sonorous effect. In order to make this still more effective, he increased the depth of the body, so that the sides should present a larger vibrating surface, and at the same time that a larger mass of air should be set in vibration in the interior; for it is plain that if the face and back of the violin vibrate the included air must vibrate also. In this manner, then, did M. Savart investigate the different circumstances which combine to produce the tone, of a violin; and when he had experimentally determined these several points, he constructed, with his own hands, a violin such as we have been describing. What was the success of his experiment, we will now show.

It is customary in France, when a new discovery or a new invention is announced, for the Academy of Sciences to issue a commission, appointing certain of its members, who are conversant with the subject, to make a careful investigation into the merits of the invention or discovery, and to report on it to the Academy;—a practice which is attended with this advantage,—that an humble but ingenious man stands a chance of having his labors appreciated. M. Savart presented a memoir on the subject of his violin to the Academy, who appointed a commission to investigate and report upon it. This commission consisted of four men of science, MM. Biot, Prony, Haüy, and Charles, and four members of the Academy of the Fine Arts, MM. Cheru-

bini, Catel, Berton, and Le Seur. M. Biot, the distinguished philosopher, drew up the report, and as his account of the trial of the instrument is very interesting, we will translate his own words, as given in the *Annales de Chimie et de Physique.*

The question was, how would M. Savart's instrument, constructed by his own hands, stand the test of comparison with a good old violin.

"To assure themselves of this," says M. Biot, "the commission invited M. Lefebvre, chief of the orchestra of the Théâtre Feydeau, to make a trial of it before them. This able artist, whose performance on the violin—full of grace and sensibility—has been long known and appreciated by the world, yielded to our desire with much courtesy: he was willing to compare the violin of Savart with that which he was in the habit of playing, and which is so full of expression in his hands. He played the one and the other in succession before us; and the new violin was found to possess a greater purity of tone, and a more perfect equality in the different tones; the last of which qualities is known to be very rare. The new violin, heard from a short distance, appeared to have somewhat less brilliancy than the other; but this difference decreased at a greater distance. The better to assure ourselves of the comparison, we requested M. Lefebvre to retire to an adjoining room, and to play the same passages alternately on the two instruments, without telling us which he was about to play; when they were found so nearly equal, that the most practised persons confounded one with the other; or if there were any difference, it was that the new violin had a little more sweetness of tone."

Here then we see that a man of science—without mechanical experience—was able to make a violin which stood the severe test of comparison with an old one of long celebrity, and in the hands, too, of a first-rate player. There certainly appears no reason why a common mechanic should not be able to produce a violin of equal, or nearly equal, excellence. It does not seem necessary that the handle or neck, or the disposition of the pegs, &c., should be different from usual: but the particulars in which M. Savart's violin differed from those of ordinary construction are those which we have mentioned, and which we may sum up together as follows:—1. Instead of having the face and back of the body curved, he formed them of flat surfaces each surface being made of two pieces, similar in size and direction of grain; 1-5th of an inch thick at one edge, and 1-12th of an inch at the other, united by their thick edges. 2. The sides were made perfectly straight, instead of being hollowed out. 3. The bridge was made a little higher than usual, to suit the altered shape of the body. 4. The strengthening bar, or bar of harmony was placed under the middle of the instrument instead of at one side of the middle. 5. The holes in the upper surface were straight instead of being curved like an *s*. 6. The sounding-post was placed very near one of these holes. 7. The sides of the instrument were deeper than in the ordinary violins, so that its internal capacity was greater. Eight years ago, Sir John Herschel "longed to see M. Savart's construction tried in this country;" and we heartily join in the wish.—*Mag. of Science.*

SUBSTITUTE FOR IRON IN THE MANUFACTURE OF RAILS.

The *Journal des Chemins de Fer* says:—"An inventor announces that he has found a composition which will reduce to a mere trifle the price of rails for railroads. He replaces the iron by a combination of Kaolin clay (that used for making pottery and china) with a certain metallic substance, which gives a body so hard as to wear out iron, without being injured by it in turn. 100 kil. of this substance would cost less than 15f. and would furnish 2½ meters of rail. The Kaolin clay is abundant in France, and the valley of the Somme contains immense quantities of it."—*Mining Journal.*

CARBON PLATES FOR GALVANIC BATTERIES.

A correspondent, who states that he is engaged in galvanic experiments and who desires to be informed of the method of making carbon plates may, in the absence of any more legitimate mode, succeed in obtaining them by adopting the following plan—the only one with which we are at present acquainted. Procure thin veneers of wood, beech or elm have been recommended; steep them in spirits of Turpentine for a short time and then set fire to them. This process charrs the surface sufficiently for the purpose required—So says our authority.—Ed.

Days.	Moon's Changes.	Self registering Thermometer. Minimum.	Thermometer, in the shade. Sunrise.	9. A. M.	Noon.	3 P. M.	9 P. M.	Daily range of Thermometer.	Difference between wet and dry bulb Thermometer. 9 A. M.	3 P. M.	Winds. A. M.	P. M.	Rain in inches.	Remarks. Night.	A. M.	P. M.
1		80·1	80·7	85	88·4	89·7	87·8	8·6	4·5	10	E.	E.	0·01	Fine.	Cloudy.	Cloudy.
2		81·2	81·6	86·7	87·9	88·5	84·8	7·3	5·5	8·5	E. light.	E.	,,	Ditto.	Light Clouds.	Ditto.
3	☽	81·8	82	86	87·6	88·8	84·8	7	5	7	W.	W.	,,	Ditto.	Cloudy.	Ditto.
4		82	82·8	87	88·4	88·9	83	6·9	7	7	Ditto.	Ditto.	,,	Ditto.	Ditto.	Ditto.
5		81·7	82·5	86·2	87	86·7	82	5·3	6	7	Ditto.	Ditto.	0·09	Slight rain.	Ditto.	Dark&Cloudy
6		75·2	77·5	83·7	85·8	87	81·7	11·8	4·5	7·5	W. light.	Ditto.	0·24	Ditto.	Ditto.	Cloudy.
7		79·2	79·9	85·4	87·5	88·5	85·4	9·3	6·5	8	W.	Ditto.	0·01	Fine.	Light Clouds.	Light Clouds.
8		80·1	80·8	86·6	88·5	90·3	87·3	10·2	7	8·5	Ditto.	Ditto.	,,	Ditto.	Ditto.	Ditto.
9	○	82·3	83·8	87·8	89·8	91	87	8·7	7	9	Ditto.	Ditto.	,,	Ditto.	Ditto.	Ditto
10		84	84·8	86·3	88·7	86·5	84·5	4·7	8	8·5	Ditto.	Ditto.	,,	Ditto.	Dark & Cloudy.	Dark&Cloudy
11		78·3	79·7	84·8	86·4	86·8	84	8·5	4	5	N.	N.W.	0.82	Rain.	Cloudy rain.	Ditto.
12		81·2	81·5	85·3	86·7	80·2	81·3	6·5	3	2	E. light.	E.S.E.	2·27	Fine.	Cloudy.	Thun.stm.rn.
13		78·3	79	83·8	85·5	86·9	84·1	8.6	4	6.5	W.	W.	0·01	Ditto.	Dark &Cloudy.	Light Clouds
14		82·3	83·8	85·4	87·2	90	87	7·7	8	11·5	Ditto.	W. strong.	,,	Ditto.	Ditto.	Cloudy.
15		81	81	85	86·8	87	84	6	6	7·5	W. light.	W.	,,	Ditto.	Ditto.	Ditto.
16		75·2	77	80·6	82·9	85	83	9·8	3	5	W.	Ditto.	1.0	Rain.	Rain.	Light Clouds
17		80·4	81	82	85·4	80·4	80·2	5·2	4·5	3·5	Ditto.	N.	0·37	Fine.	Slight rain.	Rain.
18	☾	78·3	79	83·6	85·2	83·5	82·4	6.9	3.5	4·5	E. light.	E. squally.	0·01	Ditto.	Cloudy.	Cloudy.
19		79·3	80·2	83	86·7	87·6	83·9	8·3	3	8·5	E.	Ditto. strong.	,,	Ditto.	Dark &Cloudy.	Light Clouds
20		80	80·7	86	88	89·3	85·8	9·3	5	9·5	Ditto.	E.	,,	Heavy dew.	Light Clouds.	Clear & fine.
21		79·6	80	87	89·6	91	86·2	11·4	7	10	Ditto.	Ditto.	,,	Ditto.	Clear & fine	Ditto.
22		83·5	83.8	88	90	91.5	87	8	7	9	Ditto.	Ditto.	,,	Ditto.	Light Clouds.	Light Clouds.
23		83	83·6	86·6	89·8	90·8	84	7·8	7	9	Ditto.	Ditto.	,,	Ditto.	Ditto.	Ditto.
24		81·8	82·4	84·5	88	90·6	86·1	8·8	5	11	Ditto. strong.	Ditto.	,,	Fine.	Cloudy.	Ditto.
25		80·3	81	85·3	88·4	89·5	83	9·2	6·5	10	Ditto. Ditto.	Ditto. strong.	,,	Ditto.	Ditto.	Ditto.
26	●	80·3	81	85·5	,,	88·9	82·7	8·6	5	10	E.	E. light.	,,	Ditto.	Light Clouds.	Cloudy.
27		80·3	81	84·7	84·8	84·5	81·8	4·5	5	4·5	W. light.	N.N.E.	0·90	Rain.	Dark & Cloudy.	Dark&Cloudy
28		79·5	80·4	85	87	87.7	83·2	8·2	4·5	8·5	E.	E. strong.	,,	Heavy dew.	Light Clouds	Ditto.
29		80	80·8	83.1	87·5	89·1	84·6	9·1	4 5	10	Ditto.	E.	,,	Ditto.	Ditto.	Light Clouds.
30		80·4	81·1	84.9	87·5	88	85·4	7·6	5	7·5	E. strong.	Ditto.	,,	Ditto.	Ditto.	Ditto.
31		80·4	81·3	85	89	87·3	85	8·6	5·5	8	E.	Ditto. squally.	,,	Fine.	Ditto.	Cloudy.
Mean		80·3	81·1	85·1	87·4	87·8	84·2	8·0	5·3	7·4						

Minimum.......................... 80·3 } Mean { Difference of wet and dry
Medium............................ 84·2 }   { Bulb Thermometers....... 6·3   S. M. Ll.

TO OUR SUBSCRIBERS.

The readers of the 'Review' will have experienced some surprise at the great delay which has attended the appearance of the present number, and with Prince Henry of the play will be ready to exclaim, "*I did not think to hear you speak again.*" Our honest and painstaking endeavour to render this publication worthy of more patronage than it has received will save us, we trust, the ungracious application of the retort which our readers may remember the Prince aforesaid draws upon himself by the exclamation which we have quoted. But whatever our readers may or may not have thought, we deem it not the less imperative on us to lay before them the grounds on which we have been led to protract the present issue of the Review to so late a period.

We have at various times earnestly appealed to our Subscribers on the subject of arrears, and although upon each occasion we have been favoured with remittances in liquidation of a few subscriptions, they have borne a very small proportion to the number of those which ought long ago to have appeared on the credit side of our books.

The little encouragement afforded in this country to the publication of a work devoted to scientific and mechanical pursuits is in itself sufficient to deter any, but a warm lover in the cause, from such an undertaking as that we have endeavoured to carry on; but if to the "*plentiful lack*" of literary and scientific aid we add, as in our case we may, the lack of pecuniary means arising from the causes we have referred to, it might excite less surprise were we now penning our own epitaph instead of an apology for coming to life again.

On a fair examination of the state of affairs as connected with the Review, it was for some time our intention that our labours and anxieties should cease with the present number, and that a just transfer should be made to the pockets of our subscribers of an amount pecuniarily equivalent to the incompleted portion of the Review. This design, on several grounds, has been relinquished, and it is now our determination to redeem the pledge we gave on commencing the

present series of the Journal. Let our subscribers in arrear follow the example. At what sacrifice this must be accomplished the following statement will enable our readers pretty clearly to comprehend, and will afford them an insight of the difficulties which have for some time past led us to contemplate the entire abandonment of the design with which we started on our editorial adventure. It may farther, possibly, be useful in enabling others, who may contemplate a similar undertaking, to calculate the chances of an unprofitable investment of their capital, their time and their labour.

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THE

INDIA REVIEW.

SEPTEMBER.] —o— [1843.

BIOGRAPHICAL SKETCHES.

The Rev. George Mundy.

(WITH PORTRAIT.)

FEW characters have been less understood or more misrepresented than that of the Missionary; nor have his labours been better appreciated. Unaided by the secular arm, and sanctioned only by the more devout members of the Church of Christ, he goes forth alone to contend with the stern prejudices of the human family, and to uproot religious errors which have for ages been received by the masses of mankind as the oracular truths of heaven. Save to the inhabitants of the world of spirits, nothing can present a less imposing aspect, or one less likely to effect so mighty a purpose, than the solitary Missionary. And yet when you examine the elements of which his character is composed, the nature of the message he proclaims, the credentials he bears, and the high sanction under which he acts, it is not astonishing that he conducts himself as if he were a messenger of the Most High, nor that his labours should be rewarded by fruits which the favour of Heaven alone can secure. Nor could any thing but a consciousness of being divinely appointed and employed, sustain the spirit of a Missionary amidst hopes deferred, plans defeated and prospects blighted, to which he alone is subject. Labouring, as he does, amidst diseased mind and prostrated intellect, to heal the one and raise the other, to find, just at the moment when he had supposed a cure about to be effected, the malady assume a new and more virulent form—or the intellect just taking wing for its more congenial atmosphere, again falling

From morn till noon, from noon till dewy eve,

into more than its former darkness;—or exerting himself in the otherwise impenetrable jungle, clearing away its luxuriant but noxious foliage, and planting trees of future promise, to find, as he awakes from his dream of hopes, that the desolating tempest has left him but the scattered branches and scathed trunks of his garden of promise,—nought but the assurance that the hand which had defeated his plans, upheld him and would ultimately be a hand of blessing, could induce him to recommence that special labour or prosecute it in a new form.

During the last half century, many and varied have been the manifestations of this singular form of character:—the venerable and simple Vanderkemp at the Cape; the enterprising and eloquent Williams in Polynesia; Moffat, the apostle of the wild tribes of the interior of South Africa, together with those whose names have become familiar

as "household words"—such as Schwartz, Carey, Ward, Martyn, Corrie, Marshman, Rhenius, and others.

Of living Missionaries we shall not at present speak, save of the one whose name stands at the head of this paper, who in his own person and labours embodied and exemplified many of the excellencies of missionary character and practice.

Mr. Mundy was born near London in the year 1792. In 1815 he was converted to the faith of the Gospel. In the following year he was introduced by that devoted servant of God, the Rev. Rowland Hill, his spiritual father and pastor, to the directors of the London Missionary Society. His piety and demeanour at once secured their affection and confidence, and he was accepted as a candidate for missionary labour. He had the privilege, with many of the early students of the London Society, of studying at Gosport under that eminent man of God, Dr. Bogue. During the term of his studies, Mr. Mundy ensured the regard of his fellow-students, and the respect and esteem of his tutor. His preaching was at that early period blessed to the conversion of many. In the month of October, 1819, he embarked for India, and landed in Calcutta in March, 1820. He was appointed to labour at the London Society's station at Chinsurah, and proceeded thither almost immediately on his arrival. In the following year he entered into the matrimonial connection with his first wife, an excellent and devoted woman. Her memory and labours are not yet effaced from the minds of many who reaped the advantage of her instruction and example. She fell asleep in Jesus in the year 1824.. Owing to the failure of health, Mr. Mundy was compelled to visit the land of his fathers in 1828. In 1837 he returned to the scene of his former labours in renewed health and strength, and accompanied by his late devoted and lamented partner. In July, 1842, in the midst of her usefulness she was removed from the scene of labour to the rest and reward of the righteous. This severe and almost unexpected affliction, added to the labours of nearly twenty-four years in the impairing climate of India, materially tended to destroy the remnant of Mr. M.'s strength, and he has been, however reluctantly, compelled to retire from a field which he had occupied over so long a period of years with honor to himself and usefulness to others.

Mr. Mundy early acquired a knowledge of the Bengálí language, in which he has been a diligent preacher of the gospel and instructor of the young. In both these departments of labour it is evident he took great delight, nor was he ever weary, amid all the trials of his station, in lifting up a crucified Saviour to perishing sinners. For many years he maintained a circle of schools for the benefit of the heathen in Chinsurah and its neighbourhood. In these schools the Bible, and especially the New Testament, was fully taught: nor was he unmindful of the spiritually destitute condition of the offspring of nominal Christians and Romanists. Schools were established for them; they were conducted with considerable advantage to the pupils by Mr. Mundy, aided by his former and late valued wife. Nor were the lambs of the flock uncared for. An infant school, a model of its kind in India, was established and conducted till the eve of his departure by this good man, aided by the late Mrs. Mundy, whose memory must still be fresh

in the recollection of all interested in female education in India. Added to his labours as a Missionary, Mr. Mundy presided over the English church and congregation connected with the London Missionary Society's Mission at Chinsurah. His labours in this department were signally blessed to the conversion of sinners and the edification of God's people. Amongst the military especially was he made the instrument, in God's hands, of turning many from the error of their ways to the service of the living and true God. Many are the letters we have been favoured to peruse, from both officers and men, in which their present peace and future hope were traced, under God, to his ministry. Nor has Mr. Mundy been unemployed with his pen. In Bengálí he has published "Evidences of Christianity,"—"An Exposition of the gospel of Mark,"—"Letters on the Evidences of Christianity,"—"A catechism on the Christian Religion,"—a tract on "Providence," and other smaller works. In English he has published his large work on—"Christianity and Hinduism contrasted"—the copyright of which he has generously made over to the Calcutta Christian School Book Society. He has also published the following sermons: "On the death of the late Mrs. Overbeck of Chinsurah,"—"On the death of the late Bishop Corrie,"—"On Drunkenness,"—four Sermons entitled "Millenarianism examined,"—"On the disaster of the retreat of the British Army from Affghanistan,"—"Letters to Roman Catholic Laymen,"—"Letters on Puseyism,"—"A letter on Baptismal Regeneration," and the excellent "Memoir of the late Mrs. Mundy."

Nor was Mr. Mundy unmindful of the temporal sufferings of his fellow creatures; possessing in common with the majority of missionaries a practical acquaintance with the diseases of the country and their remedies, he was ever prompt to afford all the aid in his power, to "heal the sick." His advice was constantly sought by all parties in matters not only spiritual but also secular; nor was he backward to counsel and aid, if need be, those in temporal perplexity. Thus for many years was he a missionary to the heathen, a teacher of the young, the pastor of the English church, gathered by the missionaries, a doctor, counsellor and friend of the residents and sojourning christians at Chinsurah. Nor was he less attentive to the heathen.

Of Mr. Mundy's personal appearance the accompanying sketch affords a very faithful impression on the eve of his departure. As a man Mr. Mundy possessed many excellent qualities; as a christian these excellencies were sanctified and laid under tribute to the highest and most hallowed purposes. He was kind, faithful, affectionate, laborious and persevering. He possessed a thorough knowledge of human nature in its more inviting as well as in its more repulsive forms. He was peculiarly sensitive and retiring, and had a great dread of what may be termed public life. Hence he seldom of late years visited Calcutta, or could be induced to take part in any of our public institutions when in the city, although otherwise a cheerful co-operator in the plans of usefulness embraced by the religious and benevolent societies of the day.

In his views of truth and the church he was truly catholic, and though designated the pastor of the Independent chapel, he was not

so in a sectarian sense. His home, heart and church were open to all of every name who loved the Lord Jesus in sincerity and in truth.

Mr. M.'s writings are marked by good christian common sense, and scriptural views of men and things. He uses great plainness of speech, and always in accordance with truth and to the purpose. His "Christianity and Hinduism contrasted" evinces considerable talent, and must have cost the author much time and labour. His sermon on the death of the excellent Corrie developes the catholicity of his views, and the discourse on the disastrous retreat from Cabool, the generous feelings of his heart. The sermon on the death of Mrs. Overbeck, together with the memoir of Mrs. Mundy, shew the atmosphere in which he loved to dwell, an atmosphere of personal, practical devotion.

As a preacher Mr. Mundy is striking, faithful and scriptural; his pulpit addresses are extemporaneous, but they bear all the marks of being well thought out, and are deeply imbued with scriptural sentiment. His expositions and applications of the law in combination with the gospel are oftentimes deeply searching, and always adapted to arouse the careless sinner and awaken the sluggish believer. His ministrations are also marked by instructiveness and depth of Christian experience, which rendered his preaching peculiarly adapted for the matured christ'an. Mr. M. is a man of prayer; this is evident in the unction which pervades all his public services.

As a Missionary Mr. M. has been observable for his unbroken compassion for the heathen, and constant and unwearied labors amidst great discouragement.

In saying thus much of a good man, and faithful minister, we would by no means wish to assert that Mr. M. was perfect. That he had, as we all have, his imperfections, who would not be ready to admit, and none more readily than himself; for if he was useful, it was in much humility; and if he had penned a description of himself it would be, we are certain—"I am the chief of sinners"—"By the grace of God I am what I am"—

> "O, to grace how great a debtor,
> Daily, I'm constrained to be."

It is to be regretted that India should be deprived of the labors and example of such men as the subject of our sketch, but so it is. In the allwise but inscrutable providence of Jehovah, many, that to human observation appear to be best adapted for usefulness, are transferred either to other spheres, or to the more congenial atmosphere of heaven. We have previously announced that Mr. M. has been compelled, from a combination of circumstances, but chiefly from indisposition, to retire from the Mission field—it is to be feared with but little prospect of returning. This, to him and to those who wish well to India, afflictive movement, must have been materially mollified by the demonstrations of affection with which his exodus was marked. The following extracts from the last report of the Bengal Auxiliary Missionary Society will shew that Mr. Mundy lived in the esteem and departed in the affections of his fellow Christians in Bengal:—

"On the 17th of January our highly esteemed brother, the Rev. G. Mundy, left the shores of this land; in which he had laboured for nearly 24 years with ho-

nour to himself, in fidelity to Christ, and, we have reason to believe, with much advantage to the souls of men. Extreme debility and domestic affliction compelled him to leave a field of labour in which he has left his heart, and a station in which he had expended his best energies, but around which his saddest but most sacred associations must ever gather. The Lord be with him and guide him in all his ways!

The Christian community at Chinsurah presented Mr. Mundy on the eve of his departure with a silver standish, in token of their respect for his character and services, and the church and congregation assembling in the Union Chapel presented Mr. M. with a copy of the Sacred Scriptures as a mark of their affection and regard for him and his labours.

"A meeting of the members of the Church and Congregation assembling at the Union Chapel was held on Wednesday evening last, the 3d of Jany., for special prayer, for the blessing of the Lord on them as a church and people, and to commend to the divine blessing and guidance their esteemed friend the Rev. G. Mundy. Rev. Messrs. G. Pearce, Paterson and Boaz engaged in the devotional exercises. Rev. T. Boaz in concluding the services, read a letter full of zeal and affection from a pious soldier who had been brought to the knowledge of Christ under Mr. M.'s ministry; and in the name of the church presented him with a handsome copy of the Sacred Scriptures, with the following inscription:—

PRESENTED

TO THE REV. GEORGE MUNDY,

BY THE CHURCH OF CHRIST

ASSEMBLING IN THE UNION CHAPEL, DHURUMTOLLA, CALCUTTA, ON HIS

DEPARTURE FOR EUROPE,

FOR HIS TRIED AND FAITHFUL LABOURS, AS

A MISSIONARY OF THE CROSS

IN BENGAL,

IN CONNECTION WITH THE LONDON MISSIONARY SOCIETY

FOR TWENTY-FOUR YEARS.

The meeting was numerously attended and pervaded by a truly Christian spirit. The Lord be with and bless our esteemed friend in all his ways.

"Our respected brother preached his farewell sermon at the station, previously to his departure for Europe, on Monday evening the 4th of December, to a deeply attentive, numerous, and sorrowing audience. He addressed his people from John v. 25—29. At the close of the service a neat silver standish was presented to him with an address expressive of the sincere Christian esteem in which his life and labours were held by his people, and fervent prayer for his future welfare and happiness. The congregation were deeply affected during the concluding remarks of their friend and pastor, and well they might, for they will find few who will be so long preserved to them, and who will so faithfully and affectionately care for their welfare.

The following is the inscription on the standish:—

TO THE

REV. GEORGE MUNDY, MISSIONARY.

A FAITHFUL MINISTER OF THE GOSPEL OF JESUS CHRIST AND

FOR UPWARDS OF 20 YEARS PASTOR OF THE INDEPENDENT

CHAPEL AT CHINSURAH.

THIS TOKEN

OF GRATEFUL REMEMBRANCE, IS PRESENTED BY THE MEMBERS AND CONGREGATION, ON THE EVE OF HIS DEPARTURE FOR HIS NATIVE COUNTRY.

MAY THE LORD BLESS HIM ABUNDANTLY FOR HIS FAITHFUL MINISTRY IN

INDIA, AND AFTER A SAFE PASSAGE, MAY HE LONG BE USEFUL

IN HIS NATIVE LAND, IS THE SINCERE WISH AND

PRAYER OF HIS AFFECTIONATE FRIENDS.

PRESENTED 4TH OF DECEMBER, 1843.

ON OBSERVING IN ASTRONOMY—THE ARTIFICIAL HORIZON.

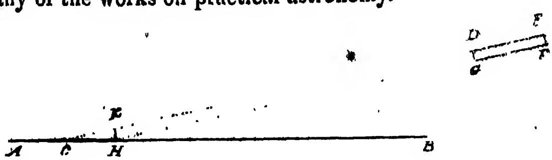
To the Editor of the 'India Review.'

SIR,

The frequent mention made in my last communication, of the artificial horizon, is the reason of my selecting it now, out of several instruments that remain to be treated as the quadrant has been. It is so useful an instrument that, combined with the sextant and a time-keeper, it has been termed a portable observatory, and not inaptly so, within the tropics, where sextant observations, made in a vertical out of the meridian, are most effective. It is made in three forms. One is a reflecting plane of dark glass mounted on three feet with screws so as to be set horizontal by a level. This has a bad character, for in the first place the reflecting surface cannot be made plane in the present state of the art. Even the small plane specula of a Newtonian telescope were described to Dr. Kitchener, the author of a very useful work on telescopes, to be only concave mirrors with a focal length of about forty feet, and his informant was an optician who made them. In corroboration of this I may mention, that in a rectangular prism which I tried to use with the eye-piece of a transit instrument to make it a diagonal eye-piece, I found the concavity so sensible that the previous adjustment for parallax was disturbed. And if so small a piece of glass can scarcely be obtained plane, how shall we succeed in getting the larger surface of an artificial horizon, to suit the purpose? There is besides the level, to meet with which perfect is almost impossible, and there is the insuperable objection of the level not being large enough to indicate a small deviation from horizontality. From objections to the level the next form of the artificial horizon is free. It consists of a piece of glass supposed plane laid on quicksilver and allowed to float. This is better than the last in theory, but in practice (and we speak from experience) the difficulty of keeping the glass free from the edges of the vessel containing the mercury renders it excessively inconvenient, and there is besides room for the objection founded on the want of a perfectly plane surface. I shall dismiss the two last forms of the instrument by observing that they are at best but approximations and can never be right. The best artificial horizon is a liquid of great mobility, which essential excludes tar and treacle sometimes recommended. The latter is said to be improved by mixing alcohol with it, and if this is really the case, as I am inclined to believe, it possesses one advantage over other fluids that the image being coloured does not require the use of a dark shade. Of the oils it may be said that they are not subject to so much tremulousness as quicksilver, but require to be kept in larger vessels that they may come to a level without obstruction. When I used castor oil as an artificial horizon, I poured it into a soup plate that the results might be free from suspicion on this ground. As a glass roof is out of the question for a vessel of this size, it is advisable to put the instrument within a box with slits, which is indeed the

cover applied to the quicksilver at Greenwich. A hat box would do well for a few days. Water is a good fluid when the observer is practised and quick in his operations: otherwise it is too liable to vaporization under the heat of our sun. Sulphuric acid deserves a trial, as I have never heard of its use. The above mentioned liquids must answer the purposes of the observer, who cannot obtain mercury, which is troublesome on account of the care which its cost exacts in putting it by after use, and on account of the oxide which must not be allowed to appear on its surface when in use. To get rid of it the observer should always keep a larger quantity of mercury in his bottle than he requires, and then by holding the containing bottle vertically while pouring out the liquid metal, he will always leave the oxide floating on the top of the mercury which remains in the bottle.

The artificial horizon was invented to enable us to measure altitudes of celestial objects independent of the uncertainty of our horizon. It is efficient for this purpose, from its giving *double* the altitude above its own true horizontal plane, which double being halved affords the measure sought. The theory will be found in any of the works recommended in the last communication. In practice it has the disadvantage of not being equal to the measurement of altitudes exceeding 75°, even when the measuring instrument is from its extent capable of taking in double that angle, which is not the case with the sextant though it is with the reflecting circles. It is not only incapable of measuring large angles, but *in its usual form* it is incapable of measuring small ones also. Theory shews that the lower the object the greater must be the length of the artificial horizon, that the field of view of the telescope may be filled from it; and practice shews that the smaller the instrument is the nearer the observer must get to it to make his observation satisfactorily. Thus if the altitude of the object should be 15°, the telescope of the sextant must almost touch the ordinary artificial horizon, but if a tank of clear water be used, as in calm weather it may, the angle may be taken from the roof of a house hundreds of feet distant. This will be better elucidated by a simple diagram which I hope to be excused for giving, in consideration of the matter not having to my knowledge been fully reasoned out in any of the works on practical astronomy.



Supposed that the line AB represents the artificial horizon, CD the reflected ray from an object about 15° above the horizon, and DE FG the telescope whose axis will be in one straight line with the axis of the reflected pencil. Produce FG to H, then CH is the *least* length of the artificial horizon which will suffice for the diameter DG or HK (HK parallel DG) of the object glass of the telescope. And as CH is proportional to the secant of the zenith distance, which secant in-

creases with great rapidity, as the angle increases beyond 60° or 65°, it follows that the length of the artificial horizon must be increased on the same proportion as the secant of the zenith distance is increased by the increase of the zenith distance, which is equivalent to the diminution of the altitude, these two being complemental to each other. But it is evident that we cannot have an expansible trough for the mercury, because such a thing is not made. It is true that an expansible trough might be made, but it would require a corresponding roof, which appears a much greater difficulty.

This subject may however be worthy the attention of makers of such instruments.

The oils may be used with great advantage in the neighbourhood of streets through which carriages frequently pass, and they are also cheap.

Some very great advantages attend the use of the artificial horizon in combination with reflecting instruments. Since double the angle required is given, the result must be halved, and consequently any error in the reading off is halved, which is of great consequence in observations for latitude and time. Again, in observations for time, the velocity of the sun or star is doubled, and hence any uncertainty about the exact beat of the time-keeper at which a contact or coincidence took place is only half as great as it would be in the observation of the simple velocity by an altitude and azimuth instrument. It is this property also which makes the method of determining the longitude by the moon's altitude so eligible (within the tropics) when compared to lunar distances. On the other hand, the collimation error of the sextant is considerably increased by doubling the angle, and therefore if observations are not taken in opposite parts of the hemisphere, the collimation error should be corrected as carefully as possible. But no good sextant observer confines himself to observations in one direction. Nor does he omit to reverse the roof of the fluid horizon, when one is used, so long as the observations are only in one direction. If in different directions as E. and W., N. and S. the roof must not be reversed. This it is of great importance to bear in mind since no glasses are perfect.

The artificial horizon has other uses which I shall explain in connexion with the instruments to which they are subsidiary.

Yours faithfully,

A. B.

WIRE DRAWING.

To the Editor of the India Review.

SIR,

Although I do not feel myself capable of removing all the doubts and difficulties which pervade the mind of "*An Enquirer*" in your last No., on certain dogmas laid down by Dr. Carpenter in his "Cyclopedia of Natural Science," I am nevertheless induced to comply with the call your correspondent has made on the subject, in the hope that

on one point at least, mooted in his letter, I may, by the citation of a few facts of a most undoubted character, assist him in arriving at a clearer understanding of the subject.

The point to which I refer will be better understood by quoting the following passage from the letter of "An Enquirer" at page 484, in which, having alluded to Dr. Carpenter's assertion that the distance of the particles from each other results from extension, he says "that this is true of those particles which lie near the surface I can readily comprehend—I see at once that in the operation they must be moved forward and thus be separated from those particles which lie deeper or towards the centre of the mass. I do not see, however, that the mere relative displacement of the particles at or near the surface must necessarily lessen the density of the whole mass." Your correspondent thus appears to admit the fact of a diminution of density in wire subjected to drawing, but to limit the effect to those particles only which lie at or near the surface, and cannot comprehend how those particles situated at or towards the centre can be affected in the same way:—or in other words cannot admit that those particles also are moved forward simultaneously with those on the surface. The operation as it appears to your correspondent produces two effects. 1st, of moving forward or extending those particles which lie at or near the surface, and consequently of diminishing their density; 2ndly, of condensing but not moving forward or extending those which lie at or toward the centre.

Now, Sir, were this view of the case a sound or correct one "An Enquirer" would practically arrive at a result not a whit less "curious and unexpected" than that to which he informs us Dr. Carpenter refers in his Cyclopedia. To understand what that result would be I may be allowed to use a small diagram. I may also premise, for the benefit of such of your readers as are not acquainted with the process of wire drawing, that for many purposes in the arts it is necessary to reduce wire to various thicknesses, and essentially necessary also that the wire when reduced shall have one uniform thickness throughout its length: these ends are attained by the simple operation called "drawing." The principal agent being a stout steel plate with holes gradually decreasing in size, and through in these successively the wire is forced or drawn. Let us now suppose in Fig. 1., [*Plate* 38,] A. B. to represent the draw plate in section; C. D. E. the wire to be drawn, one end being reduced, by the file or hammer, and protruding through the plate sufficiently to give a fair firm hold to the forceps or pincers, by which the wire is drawn, represented by F. G. Let us now suppose the wire to have been drawn through the plate until it occupies the situation shewn in Fig. 2 at H.; the wire is now double of its original length, and on the supposition that the central parts do not move or are not extended as those toward the surface, it would result that from the point E., if we suppose the force, by which the metal is extended, to act upon its particles in proportion to their proximity to the surface, we should have a hollowed cone from H. to E., equal in depth to the quantity by which the extended metal might exceed its original length.

This would indeed be both a "curious" and an "unexpected" result; but as "*An Enquirer*," I doubt not, well knows, a result very far from

the truth: no such effect is produced,—the wire on the contrary is, throughout close, compact and solid and we are therefore led to the conclusion that, whether the density at the centre be increased or otherwise, assuredly the particles there are moved or extended equally with those toward the surface. Of this truth, if your correspondent be a practical man, he must have observed a strong proof in the fact that if there be any defect in the metal subjected to "drawing," any flaw or crack at the centre, it will be generated throughout the whole length whether that be extended to five feet or fifty.

Perhaps, however, one of the strongest and most convincing facts on record, to which I can direct the attention of your correspondent, is that of the ingenious and scientific method practised by Dr. Woollaston for obtaining a platinum wire for micrometrical purposes. A wire of platinum 1-100th of an inch in diameter was placed in the centre of a cylindrical mould, the diameter of which was 1-5th of an inch: silver was then cast round the wire in the mould, and the cylinder of silver thus obtained was drawn in the ordinary way until it would no longer sustain the force required in the operation. This delicate wire was then immersed in boiling nitric acid by which the silver was dissolved and a platinum wire obtained of which the diameter was the *three-millionth of an inch.*

The result in this case shews, at least, that the central parts of the mass had experienced, equally with those more remote, the force by which the elongation of the whole was effected.

In the hope that your correspondent will take in good part the intention of this communication, and that you will pardon its length,

I beg to subscribe myself,

Your constant reader,

A MECHANIC.

MR. HUDSON'S HYDRO-PLENÆRIUM.

To the Editor of the 'India Review.'

SIR,

BAROMETRIKOS will excuse me for saying he has been too hasty and premature in putting in his veto against Mr. Hudson's "Hydroplenærium," or Water Barometer, which he perchance writes "Plenærium" by mistake; and then defining it to be nothing at all, holds an argument against himself, as it is against his own insignificant term.— Mr. Hudson expounds his own theory as bearing upon a "Plenum" of compressed air. I have seen his instruments at work during the last three months, and I believe comprehend also his method of charging them with water, which is not only ingenious but simple, yet an effective expedient. He thereby ensures a compression of six inches in the glass-tube, when the water in the tin-tube makes a column of three feet, and the water then is in a state of equilibrium between elastic compression of enclosed air and the atmospheric pressure. His semi-tangent scale, is also a sound idea, because from a six inch ra-

dius all the mensurable results may be had, by simple trigonometry to any height of the atmosphere. He has given us his first observation at 40 feet as yielding a difference of one-eighth of an inch, be it a little more or less; it matters nothing to the purpose. He has also I believe sent you a second article containing his reserved arguments, which I premise BAROMETRIKOS will have no reason to despise: let him only reflect that compressed air was never before tried on the same score: in fact its reprobated expansibility has an advantage in my opinion over the action of a vacuum or common barometer, in comprising the powers of a thermometer and uniting them with those of the barometer; which Mr. H. has well remarked, as a thermo-barometrical principle, which as combining the properties of two atmospheric influences are consistent therewith, and a desideratum with our celebrated philosophers,—the want of such a combined influence, having entailed many difficulties in meridional mensuration. His Mercurio-plenærium, which I believe he intends calling the "Plenometer," we have to wait for, until he can procure proper tubes—therefore BAROMETRIKOS will understand, that Hudson needs no prevarication of terms; and we of the republic of science (the property of all nations) have an avowable right to honor novelty, when it enters our invulnerable jurisdiction, with common recommendation; although that right be astounding to all the Athenians or Babylonians! The Differential-thermometer adverted to by your correspondent, is most assuredly a very different instrument, as applied to temperatures alone, with air uncompressed, worked by elasticity indeed, but unsusceptible of atmospheric pressures. Has BAROMETRIKOS constructed the instrument, Plenærium be it named, before he entered the public arena? I doubt it!

Reasoning upon positive facts and evidence, I have a right to say, that Mr. Hudson has hit upon a most magnificent theory, and he shews us how and when to charge his instrument, for a perfect zero; and as he has ensured it is presumed by such means, a remarkable susceptibility to it, he has undoubted merit of a superior order, and comparable with the magnitude of European science. The question of evaporation is an insignificant one, because the instrument may be charged on the spot or at the time of making any delicate experiment, and as his Herculean plenæriums may be made of tubes lengthened from three to twenty feet and more; where, I say, is there any Torcellian, that will vary itself to afford such comparisons as those extensions will indicate, to absolute philosophy?

I admire science myself, and in India where there has been the least, let us not talk of conceit and such offensive, ungenteel things, when the sparks of evident genius are luminous, under the dispensations of Divine providence!

I am, Sir,

Your obedient servant,

CANDOUR.

18th March 1844.

AN INSTRUMENT TO PROTECT THE WATCH IN THE FOB OR WAISTCOAT POCKET.

To the Editor of the 'India Review.'

Sir,

I lately saw, at a Watch Maker's in this city, a very simple and ingenious little instrument for securing the watch in the fob or waistcoat pocket, the invention, I was informed, of Major Simmonds of the Bengal Army. I do myself the pleasure of sending you a brief description of it, such as will enable any of your readers to have one made as a check on the growing boldness of our Calcutta Barringtons, whose exploits at auctions, races, town-hall meetings, the Indigo mart, or other places where "merchants most do congregate," render the adoption of some such guard, if not indispensable at least very necessary.

Its construction will be understood by reference to the enclosed drawings. Figures 1, 2, and 3 [*Plate* 35] shew the size and shape of the various parts of which it is composed. Figures 4 and 5 are merely different positions of figure 1:—in the original this was of gold, but for the sake of economy it may be formed of any other metal, as, for instance, of silver, or brass gilued would answer equally well. The thickness is a little more than that of ordinary card. It is here represented flat, but is bent, when completed for use, as seen in figure 9. A. B. is a slit or opening quite through the plate: CC are two projections with small holes drilled through them. Figure 1 is a front or inside view; figure 4 is a back or outside view; DD are two knuckles or joints soldered on the back, one on each side of the opening A B; E is a small ring or staple also soldered on the back of the plate. Figure 5 is an edge view and shews more clearly the parts already mentioned, namely the two knuckles D. D. and the ring E.

Figure 2 is a stiff steel spring having two projections and holes at C. C. corresponding to those in figure 1, to which it is rivetted, when in its place.

Figure 3 is a small lever of the same metal and also of the same thickness as figure 1. One end is turned up and pointed; its breadth is equal to that of the opening A B in figure 1 into which it fits. It is furnished with a knuckle D corresponding with those in figure 1,; the other end is a small circular plate as shewn in figure 6.

Let your readers now suppose the spring, figure 2, rivetted on to the plate figure 1, and the latter bent near its middle in precisely the same manner as in the ordinary watch-hook worn by elderly ladies a few years ago, "when George the third was king;" and lastly, let them suppose the lever figure 3 adjusted in its place and fixed by a pin passing through the three knuckles, thus forming a hinge on which the lever may be moved as it lies along in the opening in figure 1. This arrangement is shewn in figure 7. The end of the spring figure 2 presses upon the shorter end of the lever and thus forces the pointed end or hook against the inner end of the bent plate. To preserve the sharp point, a small hole ought to be drilled in the plate at the spot where the point rests, this was overlooked in the original.

By pressing the front part of the bent plate and the small circular end of the lever which projects beyond the bend, between the finger and thumb, the pointed hook at the other termination may be brought into the position shewn in figure 8. Fig 10 exhibits the back of the instrument.

The use of the instrument may now be easily comprehended. The watch is attached to the end A of figure 7, and the chain and appendages to the ring or staple at B; the hook being withdrawn as in figure 8, the watch and that part of the instrument to which the spring and lever are attached are slipped into the fob or waistcoat pocket; but the front bent part of the plate is suspended over the edge of the pocket and on withdrawing the pressure of the fingers the hook fixes itself through the lining or material of the pocket against the plate and from this all attempts to draw either watch or hook, unless by a violence seldom ventured upon, are entirely frustrated. In the form presented in the original intrument it is not well adapted for the present fashion of wearing the watch in the waistcoat pocket, unless it be tolerably deep. This, however, is a difficulty not insurmountable, and if no more adventurous and ingenious gentleman should favour your watch-wearing readers with a modification of this really useful and ingenious little instrument, more applicable to the exigency of fashion as it prevails, I will in that case essay a "notion" of my own, and in the mean time remain—

Your's faithfully,

CHRONO.

HUDSON'S VOLTAIC BOILERS FOR STEAM-ENGINES.

To the Editor of the 'India Review.'

In hoc signo spes mea!

Sir,

Whilst glancing over a recent work of some merit, published under the very appropriate title of "Memoranda Chemica," I accidentally dwelt upon an article on Galvanism, expecting to find therein some account of the recent discoveries made, since the days of Sir Humphrey Davy, or any more modern than were expounded in the Edinburgh Encyclopedia. Those which tested chemical agency were very amusing as well as instructive; however, my first perusal was not very impressive on the phenomenon of *Heat*, produced by voltaic action, being chiefly admirant of the process by which water was decomposed into the two gases (oxygen and hydrogen) in the precise proportion of two to one in volume, returning by electric explosion water in its primitive state. However as I had some sleepless nights under medical treatment, this phenomenon of Heat, as if by intuition, seemed continually to be present to my mind, and induced me to refer to the same article again; which confirmed the latent impression in stronger colours, and hence it is due to candour, to deliver the passage as I found it, in the work, and which has roused the effort, be it called genius or any thing else, but in my humble opinion, more appropriately, the

intellectual gifts of Heaven, as such emanations of mind really are. It runs thus—"A very remarkable evolution of heat is one of the effects which accompany the voltaic as well as it does the electric machine. Heat produced by the galvanic battery, flows in a constant stream where the circuit is complete, unaccompanied by either heat or light." (The term "heat" here must have had allusion to sensible warmth during the process.) "An experiment illustrative of this fact may be shewn, by passing a wire through a small vessel containing water, with a thermometer placed in it; the wire being connected to both ends of the Battery, the thermometer will, in a short time rise, and continue to do so until the water arrives at the boiling point, and the water will continue boiling so long as the experiment is kept up." I need quote no more by way of reference, to an experimented fact, further than alluding to Mr. John Murray having found by experiment, that the *maximum* of heat was near the positive pole, the temperature gradually diminishing towards the negative: that is, if a pile of alternate strata of zinc and copper be employed and immersed in a weak solution of sulphuric acid, the more oxidable metal (zinc) will yield the positive, and the less oxidable (copper) the negative influence—the positive evolving oxygen and the negative hydrogen by specific decomposition in voltaism.

On the other hand it seems to have long been a difficulty to devise the means of ensuring the most intense power by voltaic arrangement; and it seems to be agreed that a horizontal series is the more convenient for practical purposes, owing to the facility it affords of renewing the batteries or increasing their number and intensity, by connecting them with slips of metal; the enlargement of the circuit, augmenting such intensity to any required degree, whilst the troughs diminished in action, may also be changed and renewed, without disturbing the process of combustion, ebullition or illumination: and the connecting metallic links may be likewise easily transferred from one trough to another, in the usual mode.

It occurs to me, however, that the intensity of heat and light might both be further maximized, on the principle indicated by the blowpipe process, of passing one jet through another as it were, by intersection or transmission, the same being operative in the multiplication of furnace-heat; and this principle of multiplying the intensity induced by the smaller batteries, might prove a source of raising the maximized influence in similar ratio, for conducting abstract experiments in voltaism and electricity.

As far however as the question concerns my present object, or the specialty of maintaining an equable degree of heat, for a steam-boiler, the present mode of increasing the number of plates or trough-batteries, furnishes power of sufficient intensity and even much more than is absolutely requisite, for a strong ebullition of water: such as keeping up a maximum of 250 of Fahrenheit, or any thing above 212 F. which is the "boiling point" of that fluid.

The plan observed by Dr. Hare in America called the "Deflagrator," consisting of a double-trough at right-angles to each other, seems well adapted for transferring the acidulated water to the vacant trough. When necessary, his calorimeter affords another facility,

both in point of arrangement and transfer of the plates from the acidulous to the water-trough. They do not however appear to me to excel the English method, that improved on Mr. Cruikshank's, given in Rees's Cyclopedia, as prepared for the Royal Institution, consisting of two thousand plates or a surface of 128,000 square inches or 888 square feet, also Mr. Children's herculean battery of 20 pair of plates, of six feet square or 36 square feet each, ensuring a surface of 720 square feet in all. These batteries seem to afford means quite sufficient to the purpose in view of ensuring the ebullition of water in the larger Steam-boilers.

In the annexed sketch [*Plate* 36] I have however given, in Figure 1, a specimen of the boiler and a serpentine or voluted rod (say of brass) to conduct the caloric influence from an improved Cruikshank's, the trough being insulated as well as the boiler, and the sockets of the conducting rod with glass-balls, legs and sockets :—the wires being respectively passed into the ends of the projection, perforated for receiving them or adjusting them by means of the forceps to which glass-handles are also to be attached.—The thickness of the spiral rod or conductor may of course be regulated according to the size of machinery so as to ensure all the intensity of evolving heat desirable. Figures 2 and 3 also indicate the American modes of arrangement, adopted apparently by Dr. Hare and Dr. Mitchell of New York ; and Mr. Cruikshank's method with its improvement is given in Figure 4, which may be better known in detail, by referring to the article on Voltaism in Mr. Rees's Cyclopedia ; and as the principle of these instruments is sufficiently simple and efficacious in practice, as regards the degree of intensity of heat requisite for a steam-boiler, I shall I trust be justified in recommending them for adoption and specific adaptation to the purpose of working steam-engines in the place of having coal-fires.

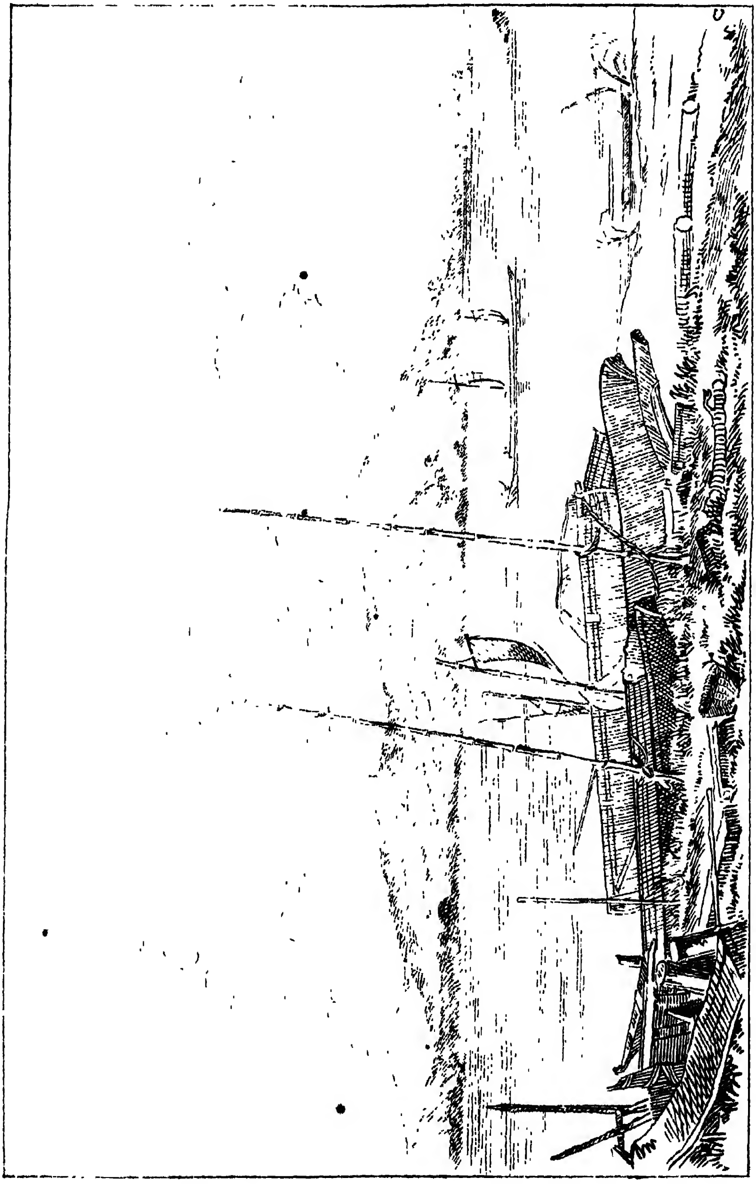
The foundation on which I thus base my scheme being assuredly unquestionable, as the fact of the intensity of heat may be considered positive ; the minor portions of the theory, or project, will doubtless bring into the field the erudite experience of every modern philosopher, voltaist or electrician, to the effect of giving the scheme all the force of their co-operation : which in fact requires no contradiction or opposition, nor any proverbial resistance, as to the matters of fact or evolution having been known *long ago* or time out of mind. Certainly many wonders have been wrought by Sir Humphrey and his able successors ; who are better known than I can name ; but the point of utility seems to me to have still been evanescent, when we contemplate that the earlier thoughts of raising mechanical power, by electro-magnetism, have been tinctured with chimera : whilst the more positive phenomenon of absolute heat has been passed over, unapplied to the objects of a competent resource, for that effective object, which by its intensity or evolution, may fully accomplish all the uses of mechanical force, and certainly with greater advantages than can be ascribed to the greater action of coal-fires, which are liable to frequent extinction and great evolutions of smoke, exposing the attendant engineer to a burning atmosphere, and involving with his casual neglects, the most direful chances of explosion and the destruction of human lives. The

fire or the boiler must constantly be attended to, and duly regulated, whereas by means of the voltaic apparatus, the due degree of temperature being thermometrically adjusted, will doubtless open a worthy source of employment to philosophical men, and ensure the magnitude due to the rising worth of our Steam concerns, in which all Europe may be said to be progressive and in a species of copartnership. Science and Commerce are thus brought into a relative connexion, promoting what we must value as a great modern resource; namely—international amity and cordiality, based on their most magnificent principles. The thought hence becomes valuable to mankind, in proportion as it compasses the maximum of utility and positive feasibility.

The uniform circulation of the voltaic fluid, not only meets the desideratum of a *constant* power, but admits of what may be termed a thermometrical adjustment of the degree of heat, according to the magnitude of the boiler and the degree of ebullition requisite for effective operation, which once being regulated, may be easily kept up with practical certainty.

It seems also necessary to make here some allusion to the use of sea-water in sea-going vessels. When sea-water is used for voltaic boilers, it will be found that the quantity of sodium contained in that liquid, will be decomposed, and will adhere to the conducting rod : it is hence expedient to depurate the fluid, by specific distillation, before it is put into the boiler. The plan of simple distillation, for which Dr. Irvine has I believe been rewarded, is not applicable to the present case; nor that proposed by Dr. Mitchell of New York, of merely mixing soda or potash, which only renders sea-water fit for washing with soap ; and though soft and milky, yet unfit for drinking. The better plan will consist in making a lixivium of wood-ashes from the stove, with sea-water ; and then distilling it. when the liquid result will be fit for beverage, and certainly improved for steam-boilers to be operated by voltaism. In order to keep up the quantity requisite, the condenser employed in the steam process, should doubtless be the means of returning a quantity with the least wastage.

Let it be recollected that the amount of tonnage-burthen is now lost to every steam-vessel, for the conveyance of the Coal requisite to keep up the fires. The Great Liverpool is said to carry 1500 tons of *coal* only, being herself about 4000 tons in burthen, which proportion is exactly $\frac{3}{8}$th of the whole tonnage of the vessel, and the others are more or less in the same ratio. Many have also been constrained to stop steaming, from the too early consumption of the coal, whilst depôts of coal must be kept up at enormous expenditures and at various positions of their route, so as to break upon the permanence of supplies, with a thousand uncertainties ; whereas the voltaic apparatus requires neither so much room nor preparatives, nor any chimney for evolving volumes of smoke and soot ; whilst a constant and uniform degree of permanence is to be ensured within plausible command, throughout a voyage : and if the vessel ever fell into barbarous hands, or those not conversant in voltaism, they could make no use of the steam machinery. Many other advantages would arise from employing the same means in War-steamers, which need not here be detailed. The zinc likewise may be easily decomposed, collected and remelted



into the metallic form, saving a total wastage: and as plates of the ordinary size of 24 by 12 inches, and half an inch in thickness, will probably be sufficient, for all component batteries, supposing each battery to contain 20 pairs and 20 batteries (and less) to ensure sufficient intensity of boiling heat, renewable of course according to the acidulous oxidation (one-sixtieth portion of sulphuric acid commencing the process and terminating with one-thirtieth) which advances with rapidity, towards the end of the process. These proportions being those indicated by Mr. Children's herculean battery, as already noticed, a little experience will doubtless provide us with the means of forming a proper regulum, when the object of pursuit is once fixed, and research multiplied therewith.

The sketches now offered will, I trust, sufficiently impress this improvement upon the minds of our cotemporaries and philosophers, and particularly invite the zeal and promptitude of every steaming Society, rewarding the freedom and candour which have prompted the present disclosure. Indeed in a case in which the interests of all Europe and European-Asia are combined, this early communication is itself a pledge of fidelity; which honor and probity may well take by the hand, and ensure it at least a comfortable retirement, devoted as it has been for the last 20 years and more, out of which your excellent Review has for the last five years, borne a liberal testimony to, being *thereby entitled* to my best thanks and unqualified acknowledgments.

I have the honor to be, Sir.

Your very obedient servant,

CHARLES HUDSON

Howrah, 1*st of February*, 1844.

VIEW OF MARTABAN.

AS SEEN FROM THE BATTERY POINT OF MAULMAIN.

(*From an original drawing taken on the spot.*)

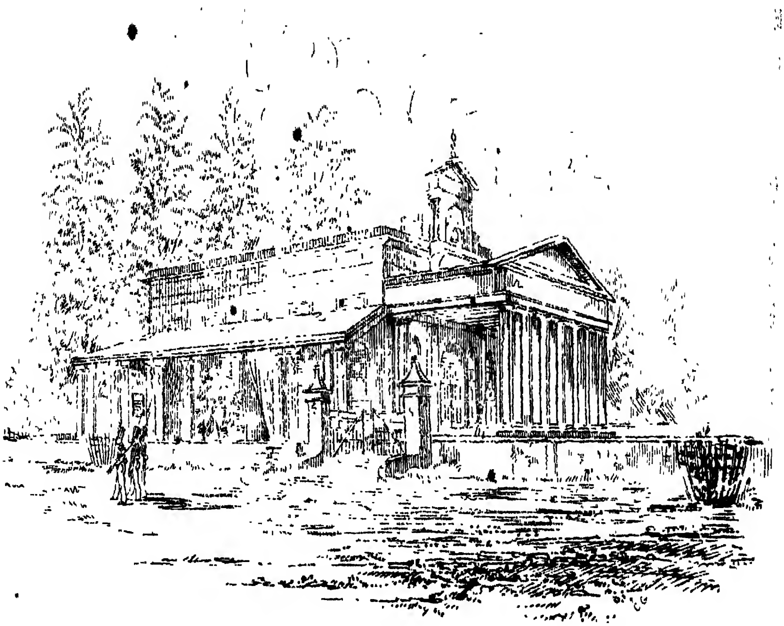
THE lithographed illustration, above named, conveys a view of Martaban as seen from the new battery point of Maulmain, which battery was erected in consequence of an alarm excited in the mind of the British Government by king Tharrawaddi's visit to Rangoon, accompanied by troops and followers amounting, it is said, to 100,000 people; the troops, it was rumoured, being intended for the invasion of Maulmain, and to cross the river from that portion of the Martaban frontier seen in the picture. Martaban in days of yore was a place of some consequence, being at one period not only the seat of government, but the principal inland port for that immense province now styled

Tenasserim, which was ceded, by treaty, to the British Government at the close of the late Burmese war. Since the establishment, by the British, of Maulmain, however, the trade of Martaban has entirely ceased, and the town itself dwindled to an insignificant village, the inhabitants of which are mainly supported by supplying the Maulmain market with fish and vegetables, for liberty to export which they are subject to various exactions, under the name of taxes, extorted by the numerous petty officers of the Burmese Government, who thus effectually prevent the poor traders from gaining more than a bare subsistence by their industry.

From the foot of the Pagoda at the point (to the right) round the base of the hill, to the foot of the Pagoda on the summit (to the left), the reader will observe a marked line which represents an unfinished stockade or fortification of wood, commenced as an intended defence against British invasion, which the Burmese Government had been led to fear in consequence of the increased force, previously sent to the neighbouring frontier by the British Government, as a precautionary measure on information of Tharrawaddi's warlike movement already referred to. This stockade was built by the compulsatory labour of the whole of the inhabitants of the district, and to such extreme rigour was their task-work carried, that, it is reported, hundreds lost their lives in consequence. Through the neglect of the Government, however, neglect which the recollection of the past has, no doubt, led the people to regard with indifference, the fortification is now fast falling into ruins,—a sad memento, whilst it lasts, of Burmese folly and tyranny!

In connection with the Pagoda, on the highest summit, there is a tradition which is worthy of record. It is said that during the renowned Ullum Prah's invasion of this part of the country, and that portion now called Tenasserim, then under the Taline government, the two belligerent powers agreed that victory should be decreed in favour of him who first accomplished the erection of a Pagoda. Stratagem gained the victory in Ullum Prah's favour. Whilst the Talines were at work on the faithful construction of a proper brick building, now forming the grand Pagoda of Maulmain, Ullum Prah, it is said, caused frame-work of bamboo to be constructed in the form of a Pagoda and covered with white cloth. The whole fabric, the tradition adds, was erected in one night, and so astounded the Taline party that, under the conviction that Gaudma, their deity, in approval of Ullum Prah's cause, had aided the erection, they submitted. The brick Pagoda now seen, stands on the site of its bamboo prototype. The ruse of Ullum Prah, for a season, turned popular feeling in his favour, but war again broke out, and much blood was shed in the conflict. The energetic measures of the conqueror, however, aided by the religious prejudices of the people in his favour, finally obtained him complete victory, though not until so many lives had been sacrificed as to render the country a waste, void of population, in which state two-thirds of it remain to the present day.

Calcutta, April, 1844. W. B.



ANNALS OF THE BARRACKPORE CHURCH.

Though of a character less marked or imposing than some of the religious edifices already brought to the notice of our readers—the simple but picturesque building in the sketch prefixed to this notice can scarcely have failed to excite the interest and attention of those whom business or pleasure may have carried to the spot on which it stands. Maugre the simplicity or even homeliness of a country church, independent of its situation or the scenery by which it is surrounded, there is, as it appears to us, in the very peace and quietness in which it seems to repose—according and harmonizing with the associated objects and purposes of such a building—an influence which at once extends itself over the better thoughts and feelings of our nature, and serves to invest the unadorned and homely edifice with an interest and importance which the more ornate and stately structure of the metropolis might fail to excite.

Under some such feelings as these the little church of Barrackpore first struck upon our attention and led to those enquiries which have enabled us to place before our readers the few brief particulars known of its history, origin, and progress.

Previous to the year 1831 there does not appear to have been, so far as our enquiries have extended, any more appropriate place set apart for public worship than a very rough Bungalow, still existing near the Sud-

der Bazar used by the Baptist Missionaries ; the members of the Establishment usually met for divine service in the Government House ; nor does the necessity and importance of a more suitable provision appear to have excited the attention of any part of the Christian community, until, at the period named, the late excellent Bishop Corrie, then archdeacon, and the Venerable T. Dealtry directed their consideration to the subject, and by their united influence and exertion raised a subscription for the erection of a suitable building, and collected for that purpose the sum of 4000 Rupees. The assistance of the Government was not long withheld, for besides a pecuniary gift in aid of the design, a grant of ground was made for the building, together with the materials of an old school house founded by lady Hastings. With these and various sums contributed at different times by the church building fund, amounting to more than 1600 rupees, the church under the architectural superintendence of Captain Patton was at length completed and opened on the 23d of June, 1833. The present archdeacon, then chaplain of the Old Church, conducted the service on this memorable occasion and took his text from 1 Kings 9 chap. v. 3. One more appropriate could scarcely have been selected, and, we can well believe, in the hands of a preacher so talented and zealous, must have proved a warm and heart-stirring address. With unfeigned sincerity we record our hope that the *word* has indeed been verified—hallowing the house and blessing it perpetually.

Whether from a miscalculated estimate of the accommodation required, or an unexpected increase in the population of the place, it soon became apparent that the building was insufficient to afford comfortable accommodation for the congregation, and not only so, but that it was besides so exposed and naked on all sides as to be, during a great part of the year, exceedingly hot. To remedy these evils a farther subscription was raised in 1835-36, and with this sum, under the direction of Captain Crommelin, the internal accommodation was extended by throwing back that part of the building on which the communion table stood. A portico and cupola were added on the north and south, and spacious verandahs on the east and west. By those alterations and additions the church was rendered sufficiently commodious and comfortable for the reception of about 200 persons.

The internal dimensions were thus increased to 71 feet by 47, the height being 21 feet.—Externally the dimensions are about 94 by 73 feet.

In addition to the alterations and improvements just named, the Government, at a subsequent period, came to the determination of enclosing the church compound, and, accordingly, a substantial wall was erected under the direction of Captain Fagan in 1840, the cost of which, sanctioned by the Military Board, amounted to Rupees 1012-4-1.

The total amount expended in the original construction of the church, and in the various additions and improvements which have from time to time taken place, has exceeded we believe 14,000 Rs. and on the church books is stated at about 1000 more.

The building is now in the hands of the Government who defray all charges of repair, allow a monthly sum for conducting the services and the maintenance of a chaplain : this will not appear otherwise than reasonable, when it is remembered that Barrackpore con-

tains the country residence of the Governor General of India, and is besides the depôt where six or seven native corps are constantly stationed.

It has been observed, and would be remarkable only were it an exception to the general rule in this country, that throughout the whole proceedings connected with the erection of this church, the various estimates whether for building, altering or adding have invariably greatly fallen short of the actual expenditure, a circumstance which tended to throw much additional difficulty and vexation on the committee appointed to carry the several objects into effect.

The church, why we are unable to explain, has not yet been formally consecrated, though virtually so by the preaching and labour of many good and pious ministers of the Established Church.

To this brief notice we can only further append the following list of resident chaplains, who have successively officiated since the opening of the church in 1833 :

The Rev. Mr. Chambers.
The Rev. Mr. White.
The Rev. Mr. Wimberley.
The Rev. F. Fisher.
The Rev. Mr. Maddock, and the present chaplain, the Rev. Mr. Gladwin.

REVIEW.

Lectures on Education, delivered at the Mechanics' Institution, by Chas. J. S. Montague. Lecture I. Calcutta, 1844.

THE cause of Education is the cause of man ; and the more means are taken to diffuse throughout the community an intelligent interest regarding education, the more will the interests of humanity be advanced. The time has now gone by for discussing the propriety of educating all classes of the community. The advocates of compulsory ignorance have been thoroughly driven from the field, and have either gone to sleep with their kindred, the owls and the bats, or have become advocates of that very enlightenment of which they were once the uncompromising opponents. The people must be educated ! The people of every land must be educated ! All ranks of the people of every land must be educated ; and the question that alone remains is as to the ways and means by which this consummation is to be realized.

The work to be done is confessedly a great one, and it is a fact that hardly any great work has ever been achieved except by the united and harmonizing efforts of multitudes. Men in their separate individuality can do little towards the accomplishment of aught that is really great ; but men by joint efforts can put forth a power whose limits have not yet been ascertained, and which for all practical purposes may be deemed unlimited. All that is wanted then for the accomplishment of the work of thoroughly educating a nation, is a system of well organized co-operation, in virtue of which every member of the community shall feel that a portion of the responsibility devolves upon himself, that he cannot shake off from himself the responsibility of his

own portion of the allotted task, and that he is bound by all the obligations that can press upon him as a man, a member of society, and a rational creature of God, conscientiously and strenuously to carry out his share of the mighty undertaking. We therefore hail every attempt to interest any portion of mankind in a subject that has been far too much neglected hitherto, and we scarcely know a fitter theme for a course of popular lectures. It is a conviction of the high importance of the subject that induces us to waive our original intention of waiting for the completion of the publication of the series before noticing the lecture now before us. We have much pleasure therefore now in introducing Mr. Montague's first lecture to our readers, reserving to ourselves the privilege, if we see fit, to make any remarks on the subsequent lectures as they appear, that they may seem to demand.

The author does not profess much in the present introductory lecture, and he accomplishes in a very respectable manner what he undertakes. He begins with a very rapid sketch of the place that the education of youth has held in the national systems of various nations. The history of education, in its principles and practice, would be one of the most valuable works that could be presented to the political, the intellectual, the philanthropic and the religious philosopher. Its execution were a task worthy of the best mind of our age. In fact it would require two minds at least, a German to collect facts, and an Englishman to arrange and systematize them. Mr. Montague's sketch we have said is very rapid, but so far as it goes is very creditable. With all deference we should submit, if we were disposed to be critical, that he does not do justice to the Romans as educationists. And this we reckon unfortunate for the cause of education itself. The Romans were unquestionably a great people. But if their education were as imperfect as Mr. Montague would lead us to suppose, the connection which he no doubt wishes to establish between educational and national greatness will be very materially weakened. That our readers may judge between our author and imperial Rome, we extract the whole of what he says in regard to Roman education.

> The Romans borrowed much from the Grecians. Their deeds and glorious achievements show a reflected light. The Grecians were the masters, and the Romans the scholars. The Grecians thought and reasoned, and the Romans put into practice the results of Grecian labor and gigantic perseverance. Before the Romans subjugated Greece, the genius of their education was military. It was not however so exclusively military as the system of Lycurgus. The Romans, disdaining commerce. devoted themselves to agriculture, and as the passions which a military education excites in the mind, had not the ennobling subjects of poetry and science to engage them and soothe their ferocity, the excitements of war urged the Roman youth to battle; quiet to them was a hell, and their minds burned with the fever of renown, until the Roman Eagle made the world his quarry, and every nation bled from the wounds his talons had inflicted. The Romans excelled in war. In this art they "had no brother;" they were unparalleled and alone. Their inferiority in the peaceful walks of science and literature is well known and admitted, while their military prowess remains also unquestioned even to this day.
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> After the Romans had conquered Greece, they were captivated with the beauties of her poetry, the depths of her philosophy, and the extent of her mathematical science. The sons of the Roman nobility were sent for their education to Greece; and though the Romans could boast of their superiority in the art of war, they were compelled to give themselves up as captives to the conquered in the several enlivening and humanizing paths of literature. They commenced

the study of the Greek language, in order to acquire the science and poetry of Greece, and yet they were never able even to equal the original. The Romans were not devoted followers of the Muses. They loved the laurels of war. They saw perfection, but they never exerted themselves to reach it. Inimitable specimens of the beautiful and the sublime were constantly before their eyes, but they looked on them with coldness and indifference. While the Greeks cherished profoundly religious opinions in their poetry and their philosophy, the Romans had abandoned themselves to a lifeless atheism. No ray of light chased away the darkness of their conception, no heat warmed the coldness of their hearts. Atheism, like an excrescence, disfigured all their mental productions, and through its opacity the light of genius could not penetrate. Its venom was found in the books they wrote—like a snake it lay concealed among the flowers of their poetry. It tainted the whole moral atmosphere, and the plague of unbounded luxury and licentiousness desolated the land.

Now we submit that this does not do full justice to the Romans as educationists. It is true that literature did not occupy much of the attention of the Romans before the period of their subjugation of Greece. But we find in the best days of the republic, and in the days of the empire, the science of education so thoroughly understood, that we do the Romans great injustice in supposing them imitators in this matter of any other people whatever. Even admitting all that Xenophon says regarding the education of the Persians to be true, and collecting the vast amount of information that is scattered throughout the Classics in regard to the systems of education practised by the Greek philosophers, we shall certainly be constrained to acknowledge that the Romans understood education as a science, and in the good days of the commonwealth practised it as an art, in a way vastly superior to any way in which it was ever understood or practised either among the Persians or the Greeks. The work of Quinctilian is itself an abiding proof of this assertion. Though that work was in some respects an imitation of Aristotle's rhetoric, yet it was such an imitation as the finished work of the painter is of the first rude sketch which he makes of the outline of his piece. The writings of Cicero also overflow with proofs of the extent to which education was understood among the Romans, and of the extent to which the education of the citizens contributed to the aggrandisement of Rome. But we do not deduce so much from the large views of Cicero as from the minute practical remarks of Quinctilian; and this is all the more remarkable when we remember that Quinctilian did not live till the days when the glories of Rome were past their meridian, for he tells us himself that he was a youth when he was acquainted with Seneca. His works are those of a man who thoroughly understands his subject, both in theory and in practice, and contain the germs of almost all that is good in the multitudes of works that have appeared since the days of Locke in regard to intellectual education. As illustrative of this remark we cannot forbear quoting a small portion of the well known dialogue on the decline of oratory, which is by some imputed to Tacitus, but which is much more probably from the pen of Quinctilian. We believe we shall best consult the tastes of some of our readers by presenting our extract in an English dress. Those who are capable of appreciating the superior beauties of the original can easily refer to the dialogue itself, while the others will accept of our version as a fair rendering of the sense.

"Who does not know that both eloquence and the other arts

have declined from their ancient glory, not from the destitution of men, but from the slothfulness of our youth, the negligence of our parents, the ignorance of our preceptors, and our forgetfulness of ancient manners? These evils took their beginning in the city, were immediately diffused throughout Italy and are now finding their way into the provinces. We know them best in their effects among ourselves. I shall speak therefore of the city and those evils peculiar and native to it, which assail our youth whenever they are born and accumulate at every stage of their lives. But first I shall premise a few observations as to the greater strictness of our ancestors in the education and training of their children. First of all then, each man's son being born of a chaste mother*, was reared not in the hut of a hired nurse, but in the lap and the bosom of his mother, whose chief praise was to keep the house and watch over her children. An elderly lady, a relative of the family, was also selected, of approved and respectable character, to whose care all the children of a family were committed, and in her presence no one was allowed either to say or do aught that was unbecoming in speech, or dishonorable in conduct. And she not only regulated their studies and their more serious concerns, but also tempered the relaxations and sports of the boys with a kind of seriousness and propriety. Thus we have learned that Cornelia, the mother of the Gracchi, Aurelia, the mother of Cæsar and Atila the mother of Augustus presided over their education, and reared princely sons. The effect of this discipline and strictness was that each one's mind, being pure and unpolluted, and not distorted by any bad habits, immediately laid hold with the whole energy on liberal arts: and whether he was destined to a military life, or the science of jurisprudence or the study of eloquence, he gave himself up to that alone and made himself master of the whole subject. But now the child at his birth is handed over to some Greek maid; to whom is added one or other, generally the most worthless of the slaves; one who is not fit for more laborious service. The tender and uncultivated minds of the children are immediately polluted by the tales and vulgar errors of these attendants: and no one in the whole house reckons it of any moment what he either says or does in the presence of the infant master, yea even the parents familiarize not their little ones with honorable conduct and moderation, but with lasciviousness and extravagance. By these means imprudence gradually creeps in and a contempt of their own and their neighbours' property. Now indeed, methinks, the vices that are peculiar to and characteristic of this city, the love of theatricals, of gladiatorial exhibitions and of horses, enter into the hearts of children even in their mother's womb. The mind which is occupied and blocked up by these passions has very little room for good arts. What proportion of men will you find who speak of aught else at home? What else forms the subject of conversation among our youths? nor do our teachers hold any discourse with their pupils more frequently than on such topics, for they collect their scholars, not by strictness of discipline, nor by the

[illegible]ginal implies that in the degenerate days in which the dialogue was w[illegible] man could have confidence in the paternity of his children. A sad proof of the corruption of morals.

credit of their talents, but by the paying of court and by clap-trap means."

These are the words of a heathen ;—of a subject of the tyrannical Domitian. And shall the christian moralist, who knows that it is the duty of parents to " train up their children in the nurture and admonition of the Lord," not lift up his voice against the French nursery-governesses, and the characterless nursery-maids, the groom and stable-boy associates, the quack newspaper-advertisement teachers of England ; the heathen nurses and ayahs and bearers of India? We know that it is an extremely difficult matter for Europeans in India altogether to avoid the similar evils to those against which this blast of Quinctilian's trumpet is directed, but still we believe that parents generally do not use all the means that they might for exercising a personal superintendence over the most important years of their children's lives. Let all those who exercise an influence over the public mind set themselves in their various places to the amelioration of this evil. Let the directors of the periodical press use their powerful engine for this end ; let the ministers of religion apply the influence of their sacred profession to the advancement of this most christian cause : and let parents remember that a most important trust is committed to them, upon the discharge of which the character and destinies of those dearest to them will in a fearful degree depend. Without pledging ourselves to all the views expressed in it, we may state that Mr. Taylor's " Home Education" is by far the best work of the multitudes that have appeared within these few years on the theory and practice of the subject. He would deserve well of our community who would unfold the application of the principles of that book more particularly to the climate and circumstances of the people of India.

And now to return to Mr. Montague and his lecture. We have only to say that we trust he will have the high privilege of directing the attention of many to a most important, but too frequently neglected subject. As we presume he is now preparing his other lectures for the press, we will take the liberty with all frankness to tender him a word of advice in regard to the language and manner of his composition. Let him avoid sweeping and exaggerated statements. A few examples will shew that this is an advice, which, like most writers in the earlier periods of their authorship, Mr. Montague not a little needs. " With our fathers, all education consisted in the cultivation of the intellectual faculties. So soon as young men had gone through a certain amount of studies, they were considered qualified to enter into the business of active life. *No regard was paid to moral education.*" That there was much that was defective in the educational system of our fathers we most willingly admit, even as we believe posterity will improve much on the system prevalent in our day ; but that in their days no regard was paid to moral education is certainly not true. Again, in the days of Alfred and Charlemagne " many (of the clergy) could not so much as sign their own names, and a greater number still could not read." Now we should suppose that very few of those who could not read would be able to write ; while those who could write their own names must at least have been able to read what they had written ; so that we should suppose the number of those who could not write would most probably be greater than that

of those who could not read. These faults taken singly appear trifling; but when they abound, they tend to produce a very injurious effect. And then in regard to language, Mr. Montague can write very well, if he did not strive to write better. It is a sage advice given by some wise master of rhetoric,—"When you write a remarkably fine sentence, draw your pen through it." Correctness and simplicity are the main things;—fine writing will come in its own time if it be not sought after; but it will never come at all if it be too sedulously courted. We might point out many passages whose composition is very incorrect, but shall content ourselves with one.

> In former times the Government formed the manners of the people. These received a complexion from the nature of the constitution under which they lived. A despotic Government debased and degraded the character of man, enervated the strength of his mind, made him a subject of fear, and caused him to practise every kind of dissimulation, and every species of treachery, to compass his ends. The fire of patriotism did not warm his soul. The hearts of the people were not altars where the ennobling passions of men, and the elevating feelings of human nature, were seen to dwell. The altars and the divinity had long departed. Low grovelling passion sat among the ruins and the corruptions of the slavish heart; the slow disease of ignorance was fast eating up the vitals and the energies of man; and superstition, even at the last struggle of life, carried its victim with it, to the funeral pile or the broad river.

Now in this passage we can see nothing more than a chaotic conglomeration of incongruous metaphors. Altars, with passions and feelings dwelling visibly upon them, other passions sitting amongst rubbish and filth, a disease with a mouth and teeth, and superstition carrying a large burden on its back, and either the superstition or the burden, though we cannot tell which, very sick, and ready to die.

The faults that we have now pointed out are easily mended, and Mr. Montague's merits are of no low order. We trust he will obtain such support for his publication as will encourage him to persevere, and we most heartily wish him abundant success in his disinterested efforts to benefit the community.

Journey to the North of India Overland from England, through Russia, Persia, and Affghanistan; by Lieut. A. Conolly, 1838.

Lieut. Conolly left London in 1829 and travelled to Petersburgh, from thence to Novogorod, the head quarters of the first military colony of Russia; then to the semi-Asiatic city of Moscow, rising like a phœnix out of its ashes. He then crossed over the Caucasus, the abode of the Circassians, "sons of the mist," and arrived at Tabriz. He was made prisoner by the Turkomans, a Tartar tribe, the Bedowins of the Caspian desert. He remained a short time at Quetta, a city of Kabul, from whence horses are sent to Bombay. He stopped at Shikarpore in Scinde, the heat of which is described by the Affghans as "capable of roasting an egg and turning a white man black." Passing near the Indus he describes the country as fertile, though much of it along the banks of that mighty stream is left uncultivated in order to afford hunting ground for the Amirs of Scinde. He passed by Rosee, a city built by Alexander (falsely called) the great, and finally arrived at Hissar, near Dihli.

Appended to the work is a "dissertation on an overland invasion of

India." Napoleon contemplated that measure by intriguing with Persia.

The march of events in Russia requires her to have commercial and political ascendancy in Central Asia. Her influence is very great in Persia, Kherasmond and Tartary, countries on the borders of Kabul. Herat and Khiva may probably soon fall under the power of Russia, and with her command of the Caspian and Aral seas, she can outstrip England by far in civilising those countries. The recent events in Affghanistan seem to have dispelled these fears of Russian invasion which were entertained so strongly a few years since. Providence appears in former days to have employed the agency of great empires as the means of introducing the arts of civilised society into semi-barbarous countries, and thus of preparing the way for the advancement of Christianity. Ought we not, then, to view Russia as a pioneer of providence in northern Asia? while England is extending the ægis of her power and laws in southern Asia. Russia, England and America are the three great colonising powers and resemble each other much in their rise and extension; Clive, Peter the Great, and the Pilgrim Fathers had no conception of what colossal empires would be the result of their plans. Russia has chiefly adopted the system of Roman colonisation by military colonies. Should spiritual christianity operate on the hearts of the Russian Czar and nobles shortly, what a vast machinery would be ready prepared for evangelisation.

Lieut. Conolly makes the following remarks on Scinde and the Amirs. "It is lamentable that provinces which from their situation and natural fertility ought to be filled with rich and happy people, should be subject to the misrule of a few ignorant despots; but the Indus must be shortly thrown open to our trade, and then will be levelled that unsocial barrier within which the jealous chieftains of Scinde have so long fenced themselves; we shall enlighten them with notions of just policy, and thus raise the condition of the people. Hitherto the Indus has been suffered to flow from its source to the Indian ocean, contributing little to the wealth or civilisation of the countries which lie upon its banks; we may hope that many years will not elapse before all parties are zealously engaged in an extended trade which will bind their interests closely together, and be the means of introducing commerce and civilisation into a new world." The insecurity of property and arbitrary exactions of the chiefs in the countries beyond the Indus, have hitherto operated as a great check to the extension of commercial intercourse. Of late years Russia has made great exertions to extend the sale of her manufactures in Turkestan, Persia and Affghanistan. Her channels of trade are by Bukhara, the Caspian and Herat. The commerce between Bukhara and Russia employs three thousand camels, and the value of the merchandise imported by Bukhara into Russia is equal in value to £330,000. The least profit the Affghan merchants gain upon the sale of English goods at Candahar and Kabul is one hundred per cent. upon prime cost. "Our trade in the countries beyond the Indus must be gradually extended; but we should at once nearly double it by establishing an emporium on the bank of the river, since we should enable the Affghans to make two voyages where they now make one. Goods brought by ship from Bombay, or from England direct, to the mouth of the Indus, could be taken up the river, and

anded at Rohree so cheaply, that we should lower the prices in Scinde and Rajputana, in the central and upper provinces of British India, and in the Panjab." The Russians are anxious to possess Khiva, which would throw the trade of central Asia almost altogether into their hands, unless England avail herself of her recent acquisitions in Scinde for the free navigation of the Indus. Almost all the recent political events in India show the great importance of establishing the seat of the supreme Government at Agra. Lord W. Bentinck, and Lord Auckland were in favour of the measure. Sir J. Malcolm in his work on central India points out the necessity of a capital for those provinces. Lord Ellenborough, who has enjoyed great opportunities from his position in connection with the Board of Control, has declared lately the great advantage that would result from making the Indus, instead of the Ganges, the medium of military communication between the north-west provinces and England.

NEW WORK IN THE PRESS.

The Court Partial.

AMONGST other items of literary intelligence with which we have recently been favored, our attention has been specially directed to a work of fiction bearing the title prefixed to this notice. Works of that character, unless the production of our Indian literati do not directly fall within our province, and we should in ordinary circumstances have passed it over, but, as we have just stated, it comes specially recommended to our consideration, and we are therefore induced to call the attention of our readers and the reading public to those claims which we feel ourselves to some extent justified in urging upon them. The work is spoken of as the clever production of a young and, would it were not so, unfortunate but talented lady, the daughter of an officer in the Bengal Army, who retired from service after years of toil in our burning clime and found his final resting place in his native land.

Of the strong motives which have urged the fair author to the publication of the work in question, we scarcely feel ourselves at liberty to speak, beyond what we have already ventured to hint at—but of the work itself we have the strongest assurances that it possesses merit enough to deserve all that we might feel disposed to say in its praise.

On the soundness and the integrity of the judgment which hath said this, and which hath assigned to us the duty which it is the object of this notice, however feebly, to execute, so perfect is our confidence that though we cannot praise we can believe and in the honest faith we entertain do most earnestly commend the work to public notice and regard. The author who passed the first years of her life in this country, cherishes the warmest hopes that an appeal to her countrymen here, on behalf of this her first production will not be made in vain, and we who know full well the kind and liberal feelings by which they are actuated on occasions of this nature, sympathise in the hope she entertains. The work we perceive is about to be published by Mr. Newby No. 65, Mortimer-street, Cavendish-square in 3 vols. The tale founded on truth—" truth severe in fairy fiction drest"—conveys the narration of events of recent note and interest, events with which our military readers will be familiar enough, but of a character such as to have rendered them matters of interest and speculation to a circle far

more extended than even that of the army. Of the dramatis personæ we are only enabled to say that they are for the most part real characters, many of them have flourished in the annals of fame and many more at the present moment hold no small place in the eye of the world.

Orders addressed to Messrs. Thacker and Co. St. Andrew's Library; Messrs. Ostell and Lepage, British Library, and to Messrs. P. S. D'Rozario and Co. Lall Bazar Road, Calcutta, will meet with prompt attention.

SELECTIONS.

RUINS OF GOUR.*

The Obelisk.

THIS is about a mile distant from the Mosque in the road which leads to the south gate, and is supposed to have been erected for the sake of calling the inhabitants to the regular performance of their daily devotions. It stands alone, completely separate from any other building. It containing a stair case within, we felt a wish to ascend to the summit; but this, as it contains four stories (marked by as many windows placed over each other in a perpendicular line,) the ladies could not venture to attempt. Having procured from the neighbouring peasants, however, the means of gaining the first story, about twelve feet from the ground, four of the company ascended to the top, which is now completely open; it contains six windows, formerly surmounted by a dome, but which has completely disappeared. From these six windows the view we had of the country on every side, was such as fully repaid the labour and risk of ascending. After feasting our eyes with the prospect on all sides, we cast them on the wall within, and discerned the vestiges of numerous former visitors in their initials cut in the walls with the date annexed. Many of these we could identify; but our attention was naturally directed to the most ancient, that we might if possible discover how long this had been the resort of European visitors. Among them we traced "W. Harwood, Ap. 17, 1771," and were on the point of fixing on him as the first who had even left his name here, when, inspecting more narrowly, we at length decyphered "M. V. 1683." This was the remotest date which our researches could ascertain, and from this, which reaches into the middle of the famous Aurungzeeb's reign, we could easily perceive that the place had fallen into decay at least a hundred and fifty years. Who this European gentleman could be, we were at a loss to conjecture; most of us agreed however in the idea, that he was some gentleman from France or Holland. This date, if Gour had fallen into decay previously to his visit, might ascertain the time of its having been abandoned†. If the Emperor Uckbar, who was co-temporary with our Elizabeth, repaired and beautified it, the period between this visit and the meridian glory of Gour, could not have been much more than ninety years.

Wishing to ascertain the actual height of this obelisk, we procured a small cord from the labourers near, and fastening a broken brick thereto, suspended it from the uppermost window; by which means we found that the height of the upper story from the ground was seventy-one feet. When to this we added the height of the cupola, &c. it seems probable that a hundred feet was the original height of the building. We also measured the diameter of the area in the upper story, and found it precisely ten feet. As the extreme diameter at the bottom was only twenty-one feet, if we reckon the thickness of the two walls at about three and a half, the extreme diameter of the upper story will be seventeen feet, so that in

* Continued from page 368.

† While this was in the press, it was suggested by a friend, who had also visited the Ruins of Gour, and observed this date, that the date was possibly fictitious, and left engraved on the wall there by some recent traveller with the view of deception. Against this we can urge nothing; from the apparent freshness of this date indeed, we are almost ready to admit its probability; but we must beg leave here earnestly to protest against a fraud of this kind. While the practice of leaving the name and the date appears useful, we would protest against a deception of this nature though done merely in a sportive way, as calculated to mislead and to remove the boundary between truth and falsehood. Truth should never be sacrificed to jest, even on the most sportive occa-

a height of seventy feet, its diameter had lessened little more than three feet, a circumstance that reflects the highest credit both on the architect and the materials of the building, when we consider that it has resisted the strongest hurricanes for so many hundred years. The steps of the staircase which remain entire are about fifty; but in many instances the intermediate ones are worn away. The windows are formed of black porphyry, which appears to have been intended for support as well as ornament, as the stones, about two feet in length, one in breadth and nearly a foot in thickness, support each other by means of tenons formed in the stone itself, and they in several instances stand firm, although the brick work has fallen from them; while they are really firm however, they assume so threatening an aspect from their appearing loose that the visitor is almost afraid of being crushed beneath them.

The Nutti Musjeed.

Proceeding southward, about half a mile beyond the Obelisk we came to a building, designated by the natives as the Nutti Musjeed, and by some Europeans termed, the China Mosque, from the bricks of which it is built being ornamented with various colours. This building however, has nothing of the mosque beyond some little resemblance in its external appearance; nor is there any thing within it corresponding with the internal appearance of the great Golden Mosque: it seems evidently intended for purposes of amusement. It is the most entire of any structure now remaining. Ist extreme length from east to west is about seventy-two feet, its breadth about fifty-four, and its height about seventy. The outer walls, though nine feet in thickness, are formed of bricks extremely small, not exceeding four inches in length, three in breadth, and an inch and a half in thickness; but these bricks are so well made, and the cement is so firm, that the building has almost the solidity of stone. The surface of these bricks is painted yellow, white, green, and blue, in alternate succession; and the whole appears to have been finished with a neatness approaching to finery. The east, the north and the south sides, have three doors, forming nine in the whole; on the west side it is closed. The arch of the middle door on each side is about eleven feet in height, the other two about nine feet high. The breadth is somewhat about six feet. On entering the east door, a partition wall presents itself, forming a space twelve feet in extent, and the whole breadth of the building. This marks the east as having been the front entrance, as this formed a kind of porch to the vestibule, in which probably servants remained. The space within these forms a beautiful room about thirty-six feet square, the four walls closing above and forming a majestic dome, which, when illuminated, must have had a most pleasing appearance. The height of this spacious room we had no means of ascertaining exactly, but from its appearance it may be from forty to fifty feet. The building is so entire, that this room might now with ease be converted into a hall for the administration of justice, or for Divine worship. So spacious and lofty a room without a pillar, beam, or rafter, none of us had ever seen; and when the antiquity of the building, the smallness of the bricks which compose it, and its present high state of preservation are considered, it seems evident that the art of building, as far as durability is concerned, was far better understood in Bengal formerly, than is indicated now by any modern edifice in the metropolis of India; and as there are cases wherein durability is a consideration of the first importance, this circumstance deserves thought. Are not European science and skill completely distanced by the former knowledge of a nation we are ready to deem only half civilized?

The South Gate.

By this time the ladies of our party felt themselves too much exhausted to proceed farther, upon which leaving them under the kind care of our friend, Mr. A., four of us ascended the elephant, and proceeded to the South Gate which formed the southern boundary of the city, and the arch of which still remains. This gate has a majestic appearance. The arch of it is thirty feet wide. It does not at present however, surmount the whole of the gateway; on the top it covers scarcely a third of that space, and even that part of the arch which now remains, is in a tottering state. On each side is a piece of masonry sixty feet square, and in height nearly equal to the outside of the arch surmounting the gateway, which is somewhat better than sixty feet. There is an ascent on the west side, and a path worn

through which it is easy to ascend to the top of the gateway, which some of us did as far as its ruinous state would permit, and enjoyed thence a fine view of the country round. The masonry is united both on the east and the west side to a rampart of earth, which also rises to the height of sixty feet and is covered with trees of various kinds. This rampart however would have formed but a feeble defence against an army of Europeans, whatever it might be esteemed against an Indian army.

The Fort.

In our return we went a little to the westward to get a view of the Fort. In our way we passed over a bridge which appeared perfectly firm, though full a hundred feet in length. On how many arches it rests, we were unable to ascertain, as the small rivulet over which it was erected, is nearly dried up, and the place overgrown with shrubs and bushes: but its being in so high a state of preservation when it can have undergone no repairs for at least the last hundred years, evidently indicates the superior nature of its materials and workmanship. Advancing farther we passed by another mosque in pretty good preservation, but remarkable for nothing beside a tradition yet current among the inhabitants around, that when it was built, a man was immured alive in the cupola for offering violence to some female, possibly one of the royal family. We entered the Fort on the east side, took a slight view of the remaining wall northward of what, as already mentioned, has by some been deemed an inclosure for a Hindoo temple, and by others, in our opinion with far greater propriety, the remains of a royal palace. The north wall appears at a distance nearly a hundred feet high, for which we could assign no possible reason, if it were intended merely for an inclosure to a temple. Leaving on our left the tombs of the Musulman sovereigns which have been so often mentioned, we hastened, as our time was so far spent, to take a view of the north gate of the fort, which perhaps presents the handsomest appearance of any of the ruins now remaining. Its breadth on the outside is fifty-six feet, and its height, full sixty. Within, it consists of one long arch somewhat more than sixty feet long, which formed the entrance ; and of two side arches, which have the appearance of vaults from their gloominess, and each of which would have contained to advantage nearly three hundred men, who, from the three arched openings on each side, about six feet wide, might have dreadfully annoyed an enemy even after he had forced the gate ; while hidden by the three massy columns eight feet square, completely covered above, and sheltered behind and at the sides by the wall which divides the gateway from the rampart, and from its time-worn appearance now almost resembles a rock, they could scarcely have been assailed in return. We ascended the west rampart here, and proceeded as far on the top of the gateway as appeared safe. This rampart, which is full as high as that which formerly surrounded the city, appears still better calculated for defence. It is sloping within but without it is perpendicular, as well as surrounded with a deep moat, at present filled with water, the alligators in which, add nothing to the sense of security felt by the traveller who visits this once far-famed capital.

Having thus taken a view of the principal ruins now remaining, we hastened to rejoin the rest of the company, whom we found most comfortably seated around a table spread, through the kindness of Mr. A. who had secretly ordered cooks there for the purpose, with all the vegetables in season and various kinds of flesh, among which we discerned the flesh of swine. Allured by the viands and the kindness of our host, we ourselves felt unable to abstain. In a few minutes however, as it grew late, we hurried the company away, ascended the elephant, and at five regained the house of our worthy friend Mr. E. after an excursion of seven hours, for the variety it afforded and the reflections to which it gave rise, to be numbered among the most pleasant we had ever enjoyed in India.

ELECTRO-CHEMISTRY ; PLATING ;—IMPROVEMENTS INTRODUCED BY M. PH. MOUREY.

As soon as M. de la Rive had published the result of his researches relative to the application of a precious metal upon another of less value, philosophers and artizans were every where seen occupied, each in his respective sphere, in applying it to manufacturing purposes or in attaining that perfection in the process, which daily experience proved to be necessary ; for the principle, though good in itself, was nevertheless susceptible of great improvements in its practical application.

Mr. Elkington, who was engaged in researches on this subject, more fortunate than the philosopher of Geneva, made use of an alkaline solvent, which indeed M. de Ruolz has likewise employed.

Very shortly after, M. Becquérel communicated to the Academy a process by which, by means of his apparatus, objects, such as filagree work, that heretofore did not appear susceptible of being operated upon, may be gilded and plated. From this period gilding and plating assumed a new character, and the Academy has already sanctioned the result by awarding the Montyon prize to the inventors MM. de la Rive, Elkington, and de Ruolz. Nevertheless, much was still wanting to plating, inasmuch as the articles, though of a perfect white colour on the removal from the bath, were not long in losing their brilliancy, and at the end of a few days even in becoming of a dirty yellow ; if the ordinary means were adopted of putting them in colour, they were altered.

Struck with this untoward result, which tended, if not to destroy, at least to depreciate so perfect an invention, I began to enquire what might be the cause of it, and I found that the yellow colour of the plating proceeded from a cyanuret or a sub-cyanuret, which remained at the surface after the operation ; and that light gradually decomposed it.

In this condition, the articles were no longer admissible in the market,—an accident which often happened to me, and caused me considerable loss ; I then determined to undertake certain researches, in which I had the good fortune to succeed ; and which, at the same time, enabled me to render an essential service to the inventors themselves, by freely communicating to them the fruit of my discovery, with the sole object of being useful to industry, which, having no longer a reason to fear these alterations in plating, may be directed to the fabrication of jewellery and other objects of art, susceptible of being plated.

The following are the means by which I attained the results indicated by the specimens before the Academy.

I thought of employing borax, which I dissolved, and with a thick layer of which I covered my articles ; I then submitted them to the action of a temperature, sufficiently elevated to calcine the borax ; I employed a muffle to place my articles in, having found this means more sure and less tedious. The temperature, at which I worked, was a little below cherry-red.

This operation over, I cleaned them in water acidulated with sulphuric acid, by leaving the articles to soak in the liquid ; the latter operation may be accelerated by means of heat. I then wash the articles, and dry them in hot wood saw-dust ; notwithstanding this drying, it is at all times necessary to subject them to heat, in order to drive away the moisture, which they may still retain. The last point is also a master-stroke, the object of which is to give a finer colour ; of which the Academy may be convinced by examining my specimens.

Moreover, I think my process so much the more useful inasmuch as it is not necessary that the articles should come out of the silver solution white, the action of the fire giving them that perfect white colour which distinguishes the specimens I have the honour to present. Such is the result of my researches, which experience has justified ; for M. Christofle, a distinguished jeweller, to whom I communicated it, as soon as I was certain of success, immediately introduced it in his workshops.

In conclusion, I should mention that if anything ought to encourage me in presenting this note, it is, without doubt, the courteous bearing of many distinguished philosophers, whom this Academy ranks in its lists, and one of whom, M. Becquérel, in reply to my communication to him on the subject, was kind enough to honour me with a very flattering letter, in which he recognized the value of the means I had employed. [A.]

At a subsequent meeting of the Academy (July 11th) M. Becquérel, in the name of "himself and MM.

Dumas and Hèricart de Thury, reports in reference to M. Mourey's process, as given above, for the treatment of electro-plating :

"The method of which we have just spoken is very rational ; for, in addition to the borax decomposing the sub-cyanuret of silver, it also dissolves the oxides which may be present on the surface of the silver, without affecting the latter."—[Ed.]—*From* "*Les Comptes Rendus,*" *April* 3, 1843.

DESCRIPTION OF THE VOLTAIC CONDENSER. BY M. DE LA RIVE.

[*Plate* 37, *fig.* 2] *A.* the pair.

B and *G*, the extremities of each of the conducting wires of the pair, which are placed in cups of mercury, or are connected at *B* with the extremity of a wire *B C*, and at *G* with the extremity of a wire covered with silk.

C, small capsule of amalgamated copper.

C D, metallic rod furnished at *D* with a spring, that keeps the end at *C*, which is bent vertically downward, in contact with the bottom of the capsule *C*.

D E, conducting wire, which connects the rod *D C* with the end *E* of the wire covered with silk.

F, helix formed of wire covered with silk rolled round a bobbin ; *E* and *G* are the two extremities of this wire.

m n, cylinder of soft iron placed in the interior of the bobbin.

p, small attached piece of soft iron, which is attracted by the extremity *m* of the cylinder of soft iron, when the latter is magnetized by the current.

H and *I*, the extremities of the conducting wires, *C H* and *E I*, which serve to include a voltameter *V*, in the circuit.

At the moment when the circuit is closed, the current circulates in *B C D E G*; the piece *p* is instantly attracted, because *m n* is magnetized ; but the circuit is immediately interrupted at *C*, because the rod *D C*, the bended extremity of which touches the bottom of the capsule *C*, is raised. The interruption of the circuit gives rise to an inducted current in the wire of the helix *F*, which is determined in the same direction as that of the pair. On the other hand, a new circuit is formed whilst the rod *D C* is raised ; this circuit, in which the pair *A* is included, is the circuit *B C H I D E G A*; the voltameter *V*, is now seen to form part of this circuit, and it is traversed at once by the induced current and by the current of the pair reinforced by the passage of the induced current through the pair. But as soon as the circuit is broken in *C*, the soft iron *m n* ceases to be magnetized, or at least is very feebly so, because the voltameter is in the circuit ; the attached piece *p* being no longer attracted, the rod *D C*, subject to the action of the spring *D*, immediately falls, and the circuit is no longer interrupted at *C*.

The current of the pair again commences to circulate by *B C D E G*, and the same series of phenomena occur. It is necessary that the power of the spring *D* and the distance of the piece *p* at the lower part of the extremity *m* of the soft iron be so combined that the oscillatory movement of the rod *D C* should be executed easily and very rapidly ; by a little adjustment the apparatus is very readily placed in the conditions most favourable to this effect.—*From* "*Archives de L'Electricitè,*" *June* 2, 1843.

NOTICE OF MR. BAIN'S VOLTAIC GOVERNOR.

Our attention was first directed to this instrument by a letter from its inventor, inserted in *The Mechanics' Magazine*, No. 1043 ; and we have since that seen it in action at Mr. Knight's.

It has evidently been designated a voltaic *governor* from its power of controlling the electric force, as the governor of an engine controls the force of the steam. In all forms of the constant battery, it is well known that the energy of the action declines in proportion as it is continued ; and that though, for many practical purposes, the action may be assumed "constant," and employed as such, yet it is in truth a vanishing or decaying action, which requires continued revival for continued operations. The invention of a battery, having the power of producing a comparatively constant action for a lengthened period of time, is beyond dispute to be ascribed to Prof. Daniell . his means of obtaining this are by surcharging the exciting liquid with sulphate of the oxide of copper, so that the exhaustion, consequent on continued action, may be recruited as it occurs. The various means of ad-

justing the action of this, and indeed of all varieties of the more or less constant arrangements, to the work to be done, are familiar enough to electricians,—being merely the taking advantage of the modifications of a *chemical* character, of which the various elements are susceptible. The novelty here introduced by Mr. Bain is the employment of *mechanical* power in conjunction with chemical affinities,—causing the two forces to counterbalance each other and produce an equilibrium or given constant action.

We are indebted to the editor of *The Mechanics' Magazine* for the diagrams [Figs. 3 and 4, Plate 37,] of two different instruments, each of which Mr. Bain has found effective.

In Fig. 3, A A is a wooden stand and framework, supporting the clock mechanism E E, and containing (in this case) two cells, B B of a Smee's battery; C C are the zinc and the platinized plates, fixed in the wooden bar, D D, and in proper electric connection: M N are binding-screws attached to the respective metals of the battery. By the attached wires the electric current passes round the electro-magnet, F. G is the keeper of the electro-magnet. It is obvious that a given intensity of electric action will always produce in the magnet a magnetic power to attract the keeper from a given distance: and, conversely, the distance between the keeper and the magnet being given, the same amount of electric action must be exercised on the soft iron core, when the keeper is attracted from the said given distance. The instrument then is used in the following manner:—By means of a thumb-screw, the electro-magnet is moved till the index, appended to it, points to any given degree of the scale I; the frame D D, with its attached plates, is liberated, and allowed to sink into the acid solution, contained in the cells. Now, this frame is suspended to the clock mechanism, acting as the weight or motive power; and its freedom to descend lasts only as long as the wheels are free to move. As the plates become gradually immersed in the acidulated solution, the energy of the current increases; and when it reaches the given standard, marked by the index, the keeper G is attracted to the magnet. But the arbor of the keeper carries a pin K, which by the backward motion of the keeper, comes into contact with the pin L, projecting from one of the wheels, and thus stops the motion and, with it, the further descent of the plates. When the action on the plates, and the reduction of the strength of the solution shall have diminished the electro-motive power of the system, the keeper is again liberated from the magnet, and, by the force of a small spring, it returns to its original position. The plates now continue their descent till the action is again exalted to the given standard, when the keeper returns to the magnet, and the descent is a second time stopped. "And," as Mr. Bain says, "so it will go on, keeping the electric current within one degree of the necessary strength, until the whole metallic surface comes into contact with the liquid."

Fig. 4 is another arrangement of the "voltaic governor." B is a cell of a Daniell's battery, placed within the frame A: it consists of an outer cylinder of zinc, to which are attached several shelves, supporting muriate of ammonia,—the shelves extend above each other, from the top to the bottom of the cylinder; and of a porous cylinder containing a rod of copper, on which slide several copper discs, each furnished with projecting pins pointing upwards, so that the discs are kept, above each other, at a proper distance apart. The copper is connected with the binding screw E, the zinc with the screw F; and these screws are respectively connected with the electro-magnet, K. On commencing operations, water is poured into the battery, as high as the level of the first copper disc; the copper rod, having one disc attached to its lower end, is placed in the porous cell; powdered sulphate of the oxide of copper is placed on the disc to the level of the pins; another disc is now slid on, and sulphate placed on it; and so on, till the discs are all on the rod. The water, for exciting the battery, is contained in the cistern C; from which, on opening a stop-cock, it flows by the pipe G. The distance between the keeper, I, and the electro-magnet, K, being adjusted as with the former instrument, the stop-cock is opened and the water continues to flow into the battery by the pipe G, until the intensity of the magnetic action is such as to attract the keeper, when the pipe G is closed by the stopper H, and the flow of liquid ceases, to be again renewed, as before, when the action is reduced. In this last instrument, there seems not any provision made for conveying

water to the zinc ; and this is very essential.

We are not in possession of any data illustrative of its action ; but it would appear far less efficient than the other, because the maximum action is not obtained by the mere *contact* of water with the metallic salts, but by its becoming *saturated* with them ; so that the action would become much exalted *after* the keeper was in contact.

It is evident that the current from these arrangements is employed by introducing apparatus in the circuit of one or other of the connecting wires.

There is a great deal of ingenuity displayed in the structure of these instruments, and especially in the former, which would seem to bring us *very closely toward*, but not *actually to* the attainment of long-continued, "constant" currents. The electrician will not be slow in perceiving that, from the time the keeper is attracted, to the time it is liberated, the action is *gradually* reducing ; and that it ranges between the power which will produce attraction to the keeper from the *given distance*, and that which will attract the keeper when in *actual contact*. With this limitation, the currents may be regarded as constant ; but it would be well for the inventor to examine the effects of their gradual reduction, and give the extent of the variation that occurs in the apparatus, which may be included in the circuit. C. V. W.—*Electrical Magazine for October*, 1843.

MR. BAIN'S IMPROVED PENDULUM. BY JOHN FINLAISON, ESQ.

"The diagram Fig. 3. Plate 38 exhibits Mr. Bain's latest improved pendulum, which is moved by a metallic surface in the moist earth of no more than four or five feet—can any man now foresee the important ends to which this little instrument may hereafter be applied ? In the ordinary use of it for the measurement of time, diminished friction, and hence, far greater accuracy, are obviously secured. Its permanence of action is probably the nearest approach yet made to the impossible chimera called the perpetual motion. Mr. Bain intends to apply it also to telegraphic purposes, in which its agency secures him improvements of the last importance, for he can certainly, by its means, discard wheels of any and every description as well as electro-magnets. A A is a mahogany case, with a glass front ; B, is a metal bracket fixed to the back of the case, and to which the pendulum D, is suspended. C, C, are permanent steel magnets, fixed to the sides of the case in such a manner, as that the pendulum ball, D, can vibrate freely between the poles of each magnet. The magnets are so placed as that poles of dissimilar names face each other. E is a small platinum ball, affixed to a brass stem, free to move to one side or the other, being fastened to a light spindle, carried by the pendulum-rod at H. The plate of copper, F, is deposited in the moist earth, from which a wire leads to the bracket, B. The plate of zinc, G, is likewise deposited in the earth, and its wire leads to the piece of metal, I. To the lower end of the suspension spring of the pendulum, is attached a wire, coated with silk. It is led down the back of the rod (which is wood), and then coiled longitudinally, in many convolutions, around the edge of the pendulum-ball, in a groove previously made for the purpose. It is then taken up the back of the rod and terminates in the bearings of the spindle, at H. The action of the engine is as follows :—A constant and uniform current of electricity would be established, and would pass through the earth, the plates and wires, in the direction of the arrows, as long as the platinum ball, E, rests on the platinum pin, projecting from the metal, I. But if the pendulum is put in motion, suppose that at first it were drawn outside until the ball, D, should be between the poles of the right-hand magnet, the point, H, being now farther to the right than the ball, E, the latter would fall to the left, and rest on the pin, K, until the pendulum took its vibration to the left, when the ball, E, would fall to the right, and so on continually, the action being produced by the change of the centre of gravitation at each vibration of the pendulum. This action of the ball, E, lets on and cuts off the flow of electricity at or near the extreme ends of the pendulum's vibrations ; so that the convolving wire of the pendulum ball is attracted and repelled by the magnets at the proper points of its vibrations, and thus a continual motion is kept up for an indefinite period of time."—*From An Account of some Remarkable Applications of the Electric Fluid.*

NEW MAGNETIC METALS.

M. Dove has proved by a series of very delicate electro-magnetic experiments, that the following metals, hitherto deemed non magnetic, are capable of

being made so ;—Copper (red and yellow), mercury, pewter, antimony, bismuth, zinc, and lead.—*Annales de Chi-*

AN INSTRUMENT FOR ASCERTAINING THE SPECIFIC GRAVITY OF FLUID.

To the Editor of the Mechanics' Magazine.

SIR,—I beg to forward, for insertion in your highly popular publication, the drawing of an apparatus for readily ascertaining the specific gravity of fluids, which I devised some months since and find extremely useful in practice. —By having the scale minutely divided, or adapting to it a vernier, it is susceptible of a high degree of accuracy, and, for all ordinary fluids, is infinitely superior to the gravity bottle and balance, and in many instances preferable to the common hydrometers, especially in commercial transactions, where rapidity and accuracy are essential points.

A and B [*Fig.* 1 *Plate* 37.] are two glass tubes, from one-fourth to three-eighths of an inch bore, and of any convenient length ; about two feet will be found sufficient for most purposes ; C a connecting brass tube and stopcock ; D and E two glasses, one for distilled water, the other for the liquid whose specific gravity is required ; F and G two milled-headed screws, carrying each a stand for one of the glasses ; H a bracket with two nuts, for supporting the screws and stands, F G · I I the scale, divided into 200, or 2000 equal parts, or degrees.

The mode of using it is simply this : —Pour distilled water into one of the glasses, and the liquid to be tried into the other, both at 60°, or any moderate uniform temperature. Exhaust the air in the tubes—either by means of a syringe, or the mouth being applied at the stopcock, C—until the lightest fluid is nearly at the top of one of the tubes ; then bring the surfaces of the two fluids, in the glasses D and E, on a level with the marks, *a a*, on the tubes, by means of the screws, raising or lowering the stands, as required ; the heights of the fluids in their respective tubes will immediately give their relative gravities, convertible into water at 1000, by simple proportion.

F. HAM.

Norwich.

THE PATENT CAMPHINE LAMP.

We have not yet arrived at that state of perfection in domestic illumination that we can do without moveable lights of some description, and the more free they are from smell, smoke, and danger, so much the more desirable are they. Oil is at all times objectionable from the danger to which carpets, dresses, curtains, &c., are exposed from any accident which might happen to the oil lamp, yet hitherto nothing has been discovered to supersede it ; where a good light is required, we think, however, the camphine lamp has effected this desideratum. English's patent camphine is a highly volatile colourless hydro-carbon (containing, however, no camphor, as its name might imply) of pure transparency; free from smell, and will not injure any substance on which it might accidentally fall ; it burns with a brilliant white light without smoke, and it is confidently stated by the patentees that it costs but $\frac{3}{4}$d. for two hours, giving a light equal to an argand burner, and during which period, from the volatility of the liquid, and the consequent activity of the capillary attraction, the combustion is perfect, and the wick scarcely charred. The appearance of these pedestal lamps is much improved by some of the reservoirs being glass globes, which (from there being no deposit from their sparkling contents) is an ornament which cannot be obtained when oil is used. The wick is so simply arranged, that a child may manage it, and, upon the whole, the camphine lamp is an elegant appendage to the drawing room, library, &c., and one which, we doubt not, will be extensively used.—*Mining Journal.*

PRESERVING IRON FROM RUST.

The method adapted by Mr. Whitesides of preserving iron from rust may be explained in a few words. The iron is heated to redness, just perceptible in the dark, and then quenched in tallow. In order to test the value of Mr. Whitesides' method, Mr. Binyon undertook to make experiments with iron hinges, one of which had been prepared according to Mr. Whitesides' plan, and fixed on a door of Mr. Binyon's premises, within twenty inches of the tiling, and when examined two months after being fixed, appeared to be tolerably clean, whereas an unprepared hinge, fixed at thirty-six inches from the top of the door, after the same lapse of time was considerably rusted. A third hinge, which had been prepared by Mr. Whitesides' process, was fixed at twenty inches from the ground and was found, at the expiration of two months, to be less free from rust

than that near the roof, but considerably cleaner than the unprepared hinge. It is to be observed that little rain had fallen during the time of trial.—*Trans. of the Society of Arts.*

LORD ROSSE'S TELESCOPE.

Professor Stevelly, in a lecture delivered lately at the Belfast Institution, showed, by reference to a large diagram, "the slight difference between the spherical figure to which a speculum is easily ground, and the figure of a paraboloid, which was formerly to be attained only by great labour, and a considerable display of mechanical skill. The nicety required in the process by which the true figure is given, may be judged of by the fact, that, if the spherical surface, which is a bad figure, and the paraboloid, of equal curvature at the vertex, were laid together at the centre, when ground of the size of Lord Rosse's great six-feet speculum, their distance, the one from the other, at the circumference, would be little more than the *ten-thousandth* part of an inch."—*Northern Whig.*

NEW BUTTONS.

The principle of forming tesseræ by the pressure of dry powder, has been applied to the manufacture of various kinds of buttons. They are called *agate* buttons, are made from the disintegrated granite which is brought from the neighbourhood of St. Austell, in Cornwall. These buttoms are pretty and clear in appearance, and very hard. They are manufactured in all shapes, and sizes, plain and ornamental; compared with the cost of mother-of pearl, we believe they are about one-third the price.—*Athenæum.*

METHOD OF SILVERING CAST IRON, AS PRACTISED BY MAJOR JEWREINOFF AT ST. PETERSBURGH.

The combination of iron with carbon (cast-iron) from the ease with which it melts, and the consequent possibility of taking the finest impressions of form, has come into very extensive application. The art of founding converts cast-iron into enormous arches, columns, cannons, and also into the most delicate bracelets, ear-rings, &c. Unfortunately the moist atmosphere very soon alters the surface of these objects, and it is found necessary to coat them with paint, which gives the cast-iron, the colour of which is itself not very attractive, the appearance of mourning. In the present state of the art of founding, cast-iron might easily be substituted for bronze, were it not for its sombre appearance, which entirely excludes it. This disadvantage may, however, be entirely overcome, from the possibility of plating it with silver; in fact, cast-iron may be readily silvered and equally as well as copper and bronze. Some successful experiments which I have made on this subject, induce me to give a short description of the method which I have employed. The liquid for silvering is prepared in the following manner:—Cyanide of potassium, prepared according to Liebig's method, is introduced into a stoppered vessel and freshly prepared pure chloride of silver, still in a moist state, added; the whole being covered with water, and shaken violently for some time at the ordinary temperature. An excess of chloride of silver is taken, and should a small quantity of it remain undissolved, a few pieces more of the cyanide are added after some time, taking care, however, to avoid having an excess of the latter salt, but always a small quantity of undissolved chloride at the bottom of the vessel. This last circumstance is important, because when the liquor contains too much free cyanide of potassium, it is easily decomposed, and moreover does not silver so well. Before employing it, it is filtered, and is thus rendered perfectly clear, iron and a little chloride of silver remaining on the filter. I effect the plating by means of a galvanic battery of one pair, consisting of a zinc and a coke cylinder, which are separated from each other by means of an earthen diaphragm. The pair are placed in a glass vessel containing dilute sulphuric acid, and dilute nitric acid is conveyed into the earthen diaphragm. Experience has shown me that the best mixture for the coke cylinders should consist of five parts by weight of finely pulverized coke, eight parts pulverized coal, and two parts common rye flour. When the cylinders are dry, they are placed in earthen crucibles, in the lids of which there is an aperture for the escape of the gases, and are then heated to redness. Those cast-iron objects may be most easily silvered which have not been painted, as the removal of the paint from the surface of the metal is somewhat difficult. The cleansed object is immersed in the silver solution, and connected with the zinc pole by means of a conducting wire, and a platinum plate immersed in the liquid at

some distance from the object to be silvered, and connected with the coke cylinder. A plate of cast-iron, of four square inches surface, is generally completely plated in thirty minutes. —*Bulletin de St. Petersburg.*

RAILWAY EXTENSION—GOVERNMENT ENCOURAGEMENT.

A letter has just been published by G. H. Lang, Esq., addressed to the Right Hon. W. E. Gladstone, M. P. President of the Board of Trade, &c "On the Importance, in a National Point of View, of Railway Extension and the Encouragement which should be afforded by Government to such Undertakings." The writer states that the circumstance which first drew his attention to the subject, is the striking difference in the situation of French and English Railways. In Gt. Britain there are at present above 100 railways, of which the great majority are at a discount, while every railway in France, with one or two exceptions, is at a considerable premium; for five years scarcely a single line of railway has received the sanction of the British Parliament, while during that period nearly every one in France has been executed, and instead of difficulty in procuring money, there has been eager competition among English capitalists to advance millions when required. He attributes the failure of so many of our English railways to the enormous expenses in procuring the Acts of Incorporation, to the absurd Standing Orders of the House of Commons, compelling 10 per cent. to be paid into the court of Chancery before an Act can be obtained, and also the compulsion to cross common roads by bridges or viaducts, either over or under the same; which, of itself, in many localities, acts as a perfect prohibition, and, in all, entails enormous and useless expenses in deep cuttings and high embankments which otherwise need not be formed. In noticing foreign railways, from Mr. Lang's observations, it appears that in Belgium the railway system may be regarded as nearly complete, the whole country is embraced in one comprehensive scheme, and each town of the smallest note is placed in direct railway communication with every town and district in the kingdom; the whole do not pay more than 3 per cent., but the Government, however, wisely regard railways not merely as a subject of revenue, but look for a return in the increased prosperity of the country. After describing the railway system in France, Prussia, and Austria, with America, which now possesses 5000 miles completed, and thousands of miles more in contemplation, he proceeds to show the effect of these railways on this country, and which, perhaps, convinces more clearly than any other argument, the absolute necessity of keeping up a cheap and rapid intercourse with every part of the kingdom, as the only means of preserving our manufactures, and placing us in a position to compete wtih the rapid strides of those of the two continents—the alteration of the foreign tariff is an instructive commentary. The Zoll-verein, or Union of Customs, which includes Saxony, Prussia, Bavaria, Wurtemburg, Baden, and nearly all the states of the German Confederation, a few years since, when these states possessed no railways, and had slender means of intercommunication, imposed a moderate duty only on British merchandise, proportionate to the value of the goods; but, now, when the German system of railways is far advanced, the duties are levied on weight, without reference to value, so that a cwt. of the finest lace and of the coarsest woollens pays the same amount of duty, which operates, as it was intended, as a perfect prohibition, as the following increase of charges will show:—

PER CENTNER—113½lb.	Former duty.	Present duty.
Woollen manufactures, common....	£0 3 0	£4 10 0
Cotton manufactures, plain	0 3 0	7 10
Linen, mixed with cotton	0 1 6	7 10 0
Silk	5 13 0	16 10 0

The American tariff affords an equally striking instance. In 1832 they possessed only 175 miles of railroad, and even then they attempted to levy high duties on foreign goods with a view to prohibition, but for want of sufficient facility of transport, it was found their manufactures could not compete with ours, and they were gradually reduced by Mr. Clay's bill, until they were of a uniform rate of 20 per cent. *ad valorem*; but in 1842, ten years afterwards, possessing 5000 miles of railways, the scale of import duties was altered—viz., on cotton goods they were raised to 30 per cent., or 50 per cent. on the former duty, and on woollens to 40 per cent., or 100 per cent. addition to the former charges. This

increase has been severely felt in our manufacturing districts, and the increased demand for British goods in the East. little more than compensates for the falling off in the American market. It is, therefore, evident that foreign Governments know the importance of railroads, that trade and manufactures flourish as facilities of communication increase, and that as foreign railways are extended, tariffs, injurious to the interests of Great Britain, make simultaneous progress. Having thus shown the effect of railways generally on the social system, and how small a measure of Government patronage would be sufficient to retain our surplus capital in their further development in this country, he proceeds to make the following suggestions for the consideration of the Government:—1. Alteration of the Standing Order, requiring deposit of 10 per cent.; if not abolished at least modified to the same scale as the House of Lords, which requires a deposit of only 5 per cent. 2. Alteration of Standing Order as to crossing roads, adding enormously to the costs, by the necessary formation of deep cuttings and steep embankments, to enable a line to go under or over a common road. 3. Exemption of low fares from taxation, as being an entire new tax on the poor, who are thereby prevented availing themselves of railway communication. 4. The extension of existing railways by the formation of branches, which would first reduce the cost per mile of locomotive power, it having been abundantly proved that the expense of working a railway diminishes as the length increases.

WOODEN RAILWAYS—PROSSER'S SAFETY BEVEL.

At the Society of Arts, on Wednesday evening last, a paper, by Mr. W. Prosser, the patentee, on this subject, was read by Mr Whishaw. It commenced by stating that the cost which had hitherto attended the formation of railroads in this country, averages 25,000*l.* per mile, being 2600 miles at a cost of 63,500,000*l.* sterling; some of these work at a profit. others pay common interest, and many make no return whatever; short branches, therefore, could not be laid down without a sacrifice of capital, and an incalculable benefit would be conferred on the public by the introduction of an economical plan which, without that risk, would promote rapid communication between towns and villages, and give them cheap and expeditious means of access to London, and to the great lines of railway. It might be calculated that wood pavement has caused a saving of one-half in the wear and tear of carriages, horses, and harness, and it had been proved that a saving equally great could be made in the construction of railroads, by the substitution of wood for iron rails. The paper then goes on to describe the construction of the rails, the form of the bevel wheels, and the functions which they perform, gives a description of the experimental line recently working at Vauxhall-bridge, with its curves, gradients, &c., all which appeared in [the Mining] Journal for the 18th of Nov. last. It then proceeds to notice some of the advantages appertaining to wooden rails which do not exist in iron; however great the advantage of iron may be on a level, it diminishes rapidly as the direction rises, from a diminution of adhesion of the wheels to the rails, and the enormous expense of long tunnels, deep cuttings, and high embankments are principally caused by this circumstance, but is entirely overcome by the substitution of these wooden rails; the great bite that the engine has upon the wood, enabling the engineer to follow the undulations of the country, and reduce the quantity of land, none being required for embankments. Railways of wood are easier to repair, and less injury is inflicted on the engines and carriages from concussion and abrasion, and there is scarce any noise, and no oscillation It has been computed that a locomotive-engine running on wood would wear longer than three on iron, and, if such be the case, a saving of 1000*l.* per annum, will be effected on each engine; the enormous weight also which engines are now made to weigh to insure a bite on the rail, may be dispensed with, as an engine weighing ten tons running on wood, has more tractive power than one weighing eighteen tons on iron, and as the concussion and abrasion on wood are so trifling that carriages weighing one ton and a half, will be as strong as those running on iron weighing three tons! He next proceeds to notice the probable durability and consequent expence of the material here recommended. On the experimental line, Scotch fir was used and after having sustained a traffic equal to twelve engines per day for seven years, the saw

marks were not effaced; it is, however intended to use beech rails in practice, and as Scotch fir, if subjected to pressure will crush under ten tons, and beech will stand eighty-two tons before it begins to yield, it is impossible to calculate the period the latter would last under the heaviest traffic; the cost, however, of a complete renewal at any time may be calculated at not exceeding 400*l.* per mile.

The advantages of wooden railways thus constructed, in point of economy, comfort, and durability, and as feeders to the great and central lines already formed, must be apparent, which, to avoid expense and mechanical difficulty, have been compelled to traverse new and barren districts, and thus avoiding the usual roads, as well as provincial towns and villages, and innkeepers and other tradesmen, who had embarked all their capital in such situations, have been brought to ruin; but this description of railway would at once open a communication on the turnpike-roads, extending over 19,000 miles in England and Wales, through towns and villages now threatened with ruin, avoid monopolies, and throw the trade into the old-established and well peopled lines; these branches would also pour into the main lines a vast accession of traffic, and yield to the proprietors a large and certain profit. The fares on railways thus constructed, if properly managed, will not exceed *two-pence* and *one penny* per mile, and, while it would thus secure accommodation to the poorer classes of society, would give ample profit to the shareholder. The great bar to the general introduction of railroads into Ireland has been their enormous cost, which the substitution of wood for iron rails will entirely obviate, and the advantages which would result to that country from railways, by giving employment to the population, by developing its vast (yet hidden) resources by opening markets for her produce, and by uniting her more closely with other countries, are so important, that it is hoped the question of a general system of railroads in Ireland, founded on this economical plan, will receive the early attention of the legislature. A model of the experimental line of railway, with the proportionate curves, was laid down in the society's room, on which a locomotive, set in motion by clockwork, and drawing a waggon containing a 56 lbs. weight, ran several times during the evening—and gave great satisfaction as to the facility with which the curves were passed, without any oscillation of the vehicle.

The first public line on this principle will shortly be commenced from the Woking Common station of the London and South-Western line to Guildford, a distance of six miles; the company is nearly complete, at the head of which are some of the most influential gentry in the neighbourhood, and Mr. Giles is the engineer.—*Mining Journal.*

PROGRESS OF IRON SHIP-BUILDING.

It is with much pleasure we see continued proofs of the applicability of iron for the erection of ships, either sailing-vessels or steamers, and the consequent increased demand for that material in the important science of ship-building. Trials with no less than three new iron ships have taken place near Liverpool during the past week—the *Loodhiana*, the *Helen Macgregor* and the *Margaret*—the former of these is a singular looking vessel with two funnels, built by Mr. Laird, of North Birkenhead for the East India Company, and is intended to navigate the Indian rivers; she is 160 feet long, with 24 feet breadth of beam, has a pair of engines of 45 horse power each, and her breadth and flatness are such that with engines, coal, and all her stores, her draught of water is only 22½ inches; she answers the helm with wonderful facility, and can be turned in her length, has a rudder at her bow as well as at stern; and is, in fact, totally different from anything yet built, and is likely to lead to considerable improvement in the construction of vessels for shallow waters. The *Helen Macgregor* is a fine vessel of 600 tons, also built by Mr. Laird, for an enterprising Hull merchant (Mr. Gee), and is intended to run between that port and Hamburgh; her length of keel is 180 feet, beam 26 feet, hold 16 feet. All her plates, ribs, and fastenings are of immense strength, and further secured by four water-tight bulkheads, dividing her into five compartments. The engines of 230 horse power have four cylinders each—a plan patented by George Forrester and Co.—these are inverted, the piston-rods projecting below, the boilers are tubular and capable of producing a large quantity of steam in a small space, and the whole of the engines and machinery take up much less room than on the old plan, and a great saving of fuel is

effected. On the 8th inst. this vessel made her first trip to sea, having on board several East India Directors, who happened to be in the town; her engines worked admirably, and no vibration could be perceived; she proceeded towards Bangor and the Menai, where the company landed, and after waiting some hours, she returned to Liverpool. The iron schooner *Margaret* is adapted either for sailing or steaming, for, in addition to the rigging of a fast sailing schooner yacht, she is furnished with Smith's Archimedean screw propeller; her length is 120 feet, width of beam 19 feet 3 inches, and will carry 170 tons; she has two small engines of 14-horse power each, and is divided into four compartments by three of Mr. C. W. Williams's water-tight bulk heads—a system that should ever be adopted, as almost insuring safety in case of striking and springing a leak, as the buoyancy of the vessel is still preserved. With a fresh breeze, and all her sails set, the propeller also at work, she made nine and a half to ten knots per hour, but as there was considered some defect in her boiler and furnace, means have been taken to amend them, and her speed with the same quantity of fuel, is expected to be increased. It has not transpired what trade she is destined for.—*Mining Journal.*

GLASS WATER AND GAS MAINS.

The subject of glass mains is attracting some attention in France. Earthenware pipes have also been used on a small scale; they must not, however, be subjected to a pressure of two or three atmospheres, as the joints, being difficult to lute, give way, whatever cement may be used. For luting, some gas companies have used Roman cement, but the gas escapes by imperceptible fissures at the joints, and they have been found so objectionable, on account of the frequent escapes and disturbance of the pavements for repairs, that the local authorities have objected to the use of earthenware mains in such situations. The glass mains, manufactured by Messrs. Bergeron, of Rive de Gier are luted with bitumen, and may be screwed together. The weight is about a third of that of cast-iron, and the cost, when laid down, runs about 7s. 6d. per yard for a $4\frac{1}{4}$ inch bore. The process at present will not produce pipes of more than 8 in. bore. Of course, in England, with the low price of cast iron and the duty on glass, glass pipes are out of the question on economical ground.—*Bulletin du Musée de l'Industrie: Civil Engineer and Architect's Journal.*

ELECTRO MAGNETISM.

Experiments made with one hundred pairs of Grove's Battery, passing through one hundred and sixty miles of insulated wire; in a letter from Prof. S. F. B. Morse, to the Editors, dated New York, Sept. 4th, 1843.

Dear Sirs,—On the 8th of August, having completed my preparations of 160 miles of copper wire, for the electro-magnetic telegraph, which I am constructing for the government, I invited several scientific friends to witness some experiments in verification of the law of Lenz of the action of galvanic electricity through wires of great lengths.

I put in action a cut battery of one hundred pairs, which I had constructed, based on the excellent plan of Professor Grove, but with some modifications of my own, economising the platinum.

The wire was reeled upon eighty reels, containing two miles upon each reel, so that any length, from 2 to 160 miles, could be made at pleasure to constitute the circuit.

My first trial of the battery was through the entire length of 160 miles, making of course a circuit of 80 miles, and the magnetism induced in my electro-magnet, which formed a part of the circuit, was sufficient to move, with great strength, my telegraphic lever. Even forty-eight cups produced action in the lever, but not so promptly or surely.

We then commenced a series of experiments upon decomposition at various distances. The battery alone, (100 pairs,) gave in the measuring guage, in one minute, 5.2 inches of gas. When four miles of wire were interposed, the result was 1.2 inches; ten miles of wire, .57 inch; twenty miles, .3 inch.; fifty miles, 094 inch.

The results obtained from a battery of 100 pairs are projected in the curve: represented in Plate 38, Fig. 3.

Table constructed from the Curve.

	in.
Battery alone	5·20
One mile	3·85
Two miles	2·62
Three „	1·84

Four ,,	...	...	1·20
Five ,,	...	...	1·05
Six ,,	...	...	·92
Seven ,,	...	...	.80
Eight ,,	...	...	.71
Nine ,,	...	...	.64
Ten ,,	...	...	·57
Twenty,,	...	...	·30
Thirty ,,	...	...	·20
Forty ,,	...	...	.14
Fifty ,,	...	...	.094

During the previous summer I made the following experiments upon a line of thirty-three miles of No. 17 copper wire, with a battery of fifty pairs. In this case, I used a small steel-yard with weights, with which I was enabled to weigh with a good degree of accuracy the greater magnetic forces, but not the lesser, yet sufficiently approximating the recent results to confirm the law in question.

Table of Results.

50 pairs through	2	miles attracted, & raised	9 oz.
	4	,,	4 ,,
	6	,,	3 ,,
	8	,,	$2\frac{1}{2}$,,
	10	,,	$2\frac{1}{4}$,,
	12	,,	$0\frac{1}{8}$,,
	14	,,	$0\frac{1}{8}$,,

and each successive addition of two miles up to thirty-three, still gave an attractive and lifting power of $\frac{1}{8}$.

Curve from the Results, Plate 38, Fig. 4.

A great irregularity is seen between the tenth and twelfth mile, which is due undoubtedly to a deficiency of accuracy in the weighing apparatus.

I take pleasure in sending you the following calculation of the law of the conducting power of wires, for which I am indebted to my friend Prof. Draper, of the New York City University.—

On the Law of the Conducting Power of Wires, By John W. Draper, M. D., &c. &c.

It has often been objected, that if the conducting power of wires for electricity was inversely as their length, and directly as is their section, the transmission of telegraphic signals, through long wires, could not be carried into effect, and even the galvanic multiplier, which consists essentially of a wire making several convolutions round a needle, could have no existence.

This last objection was first brought forward by Professor Ritchie, of the University of London, as an absolute proof that the law referred to is incorrect. There is, however, an exceedingly simple method of proving that signals may be dispatched through very long wires, and that the galvanic multiplier, so far from controverting the law in question, depends for its very existence upon it.

Assuming the truth of the law of Lenz, the *quantities* of electricity which can be urged, by a constant electromotoric source, through a series of wires, the lengths of which constitute an arithmetical ratio, will always be in a geometrical ratio. Now the curve, whose ordinates and abscissas bear this relation to each other is the logarithmic curve, whose equator is $ay=x$.

1st. If we suppose the base of the system, which the curve under discussion represents, be greater than unity, the values of y taken between $x=0$ and $x=1$, must be all negative.

2nd. By taking $y=0$ we find that the curve will intersect the axis of the x's at a distance from the origin equal to unity.

3rd. By taking $x=0$ we find y to be infinite and negative.

Now these are the properties of the logarithmic curve, which furnish an explanation of the case in hand. Assuming that the x's represent the quantities of electricity, and the y's the lengths of the wires, we perceive at once that those parts of the curve which we have to consider lie wholly in the fourth quadrant, where the abscissas are positive and the ordinates negative.

When, therefore, the battery current passes without the intervention of any obstructing wire, its value is equal to unity.

But, as successive lengths of wire are continually added, the quantities of electricity passing undergo a diminution, at first rapid, and then more and more slow. And it is not until the wire becomes infinitely long that it ceases to conduct at all; for the ordinate y, when $x=0$, is an asymptote to the curve.

In point of practice, therefore, when a certain limit is reached, the diminution of the forces becomes *very small*, whilst the increase in the lengths of the wire is vastly great. It is therefore, possible to conceive a wire to be a million times as long as another, and yet the two shall transmit quantities of electricity not perceptibly different, when measured by a delicate galvanometer.

But, under these circumstances, if the long wire be coiled so as to acted a multiplier, its influence on the needle

will be inexpressibly greater than the one so much shorter than it,

Further, from this we gather that, for telegraphic despatches, with a battery of given electro-motoric power, when a certain distance is reached, the diminution of effect for an increased distance becomes inappreciable. *Electrical Magazine for January.*

Roberts's Voltameter.

In the fourth volume of Sturgeon's Annals of Electricity, No. 23 page 401, Mr. Roberts has described a form of Voltameter, by means of which "the trouble and often difficulty of refilling the tube with the liquid to be decomposed" is entirely obviated. For a description of the original instrument, we refer to the Annals. Our present object is to embrace an opportunity, which has just occurred, and, by describing a form, in which this arrangement of Mr. Roberts's has, within these few days, been presented to us, to remind our readers of the existence of an instrument, which cannot fail in being of essential service to the practical electrician.

The instrument, that is the object of this present notice, was constructed under Mr. Gassiot's direction, and exhibited by him at the Soiree of the London Institution, held on the 20th of March.

[*Plate* 38] Fig. 5 represents a side view of the instrument.—*bc* is a U tube of glass; the part a contains the platinum electrodes *d*, of which an end view is given in Fig. 2 ; the tube *b* is ground so as to fit tightly in *a* ; it is graduated at the lower end, and terminates above by a stop-cock ; the other branch terminates above in a globe *e* from which rises a short tube closed by a screw as occasion requires. A brass rod is added to give firmness to this branch. Battery connection is made by the binding screws *e e*. The instrument is charged for use by pouring the electrolyte into the branch *c* until it rises to the zero of the scale in branch *a* ; the stop-cock is then closed. When electrolysis commences, the liberated gases displace the liquid from the tube *b* ;—a proportionate rise occurs in the other limb, and the accumulated liquid is retained in the globe *c*. When the experiment is completed, the cock is opened,—the gas escapes,—the liquid regains its level, and ready for a second experiment. Such an instrument may be kept in the circuit, and thrown into or out of action as occasion demands, by means of a wire, placed in the mercury cups *e e*, in Fig. 6.—C. V. W.—*Ibid, for April.*

The Rheo-electric Machine. By Mr. John Nott.

DESCRIPTION.

[*Plate* 38, *Fig.* 7] *A*.—Base-board, elevated by four supporters, to permit the sliding pieces *F F* to pass under.

B B.—Uprights, carrying the iron pivots of the axle.

CC.—A circular plate of glass, and another of resin, both supported on an axle of baked wood, and set in motion by the winch handle. The resinous plate must be made as hard as possible, and as brittle as glass. It must be annealed or it will not stand.

D D.—Glass pillars, cemented into wooden bases, and made to slide in and out upon the base-board. The tops of these pillars are furnished with horizontal brass springs, to which the rubbers are attached by brass-pins, so that they may be easily removed, for the purpose of cleaning or amalgamation. Each rubber is made to bend round the edge of the plate and the springs press on the middle of each lateral portion, so as to equalize the pressure, which is also adjusted by screws, the heads of which are seen in the sketch. The rubber of the vitreous plate is made in the usual way and amalgamated ; that of the resinous plate is made of cats'-fur.

E E.—Curved brass-rods, screwed to the caps of the glass pillars, and, by a silk-cord, attached to the silk-flaps *g g*. The use of these rods is to diminish the friction of the flaps, which must be made to fit the plates, with great accuracy, otherwise they would be strained by their partial adhesion to the plates, in the first instance, so that it would be impossible to work the machine with the regularity of motion that is necessary.

F F.—Sliding pieces, passing under the base-board *A*, of the machine. The stands of the conductors *H V*, *H V*, are screwed to these pieces ; by this means the distance of the conductors from the plates is regulated and the whole instrument kept steady.

GG.—Glass-rods, with wooden caps and cross-pieces, the latter bored to permit the brass-rods of the ball-conductors H H, to pass tightly through them.

H H.—Ball-conductors, supported by the rods passing through the cross-

pieces. When large accumulations of the electricities are required, these conductors are replaced by ordinary prime conductors. Or, if only one electricity is required, the vitreous, for instance, the resinous-conductor is removed, and then this instrument will generate vitreous electricity as fast as an ordinary instrument twice the size.

P P.—Copper conjunctive wire, bent at right angles, and screwed to the rods of the conductors at *V V.*

W.—Magnetic needle, suspended by a fibre of silk.

In the *Electrical Magazine*, page 132, will be found the notice of the above machine, as described before the British Association. A very full and excellent abstract of Mr. Nott's paper is given in the *Literary Gazette* Oct. 7th, 14th, 21st, and 28th last. We had wished to have given a very detailed *resumé* of the paper in the present number; but find ourselves compelled to defer it till our next. We conclude this with an interesting extract from a letter from Mr. Nott to Mr. Pollock. —ED.

"It is well known that the current of the voltaic pile exists within the substance of the Rheo-phore; and therefore, if the circuit be not interrupted, no interference can take place with this current, except perhaps by heat. It struck me that, as the current of the Rheo-electric machine exists upon the surface of the Rheo-phore, it would interfere with that of the pile. To ascertain the truth of this supposition, I set a voltaic battery in action; and, within the circuit, I placed a galvanometer. At about four feet distance from the galvanometer, there was a mercurial connection. I made the conjunctive wire of the Rheo-electric machine cross this connection atl right angles to the voltaic current. The galvanometer indicated a deflection of 35°. As soon as the Rheo-electric current was established, the needle of the galvanometer bounded to 90°, and then returned to the meridian, but never crossed it and again bounded to 90°, and thus continued to oscillate, with enormous rapidity, across its original deflection as long as the Rheo-electric current was permitted to act.

"Here then we have an alternate increase of intensity and total cessation of the voltaic current, by the mere passage, across its direction, of the Rheo-electric current; establishing a series of interferences of the most remarkable description, and proving to demonstration that electricity passes through the substance of the voltaic rheo-phore, and consequently that electricity is really the principle of the voltaic pile."—*Electric Magazine for April* 1844.

STATE OF THE ISLAND OF SICILY.

This island, once as flourishing in the production of grain as any portion of the globe, is now in a state almost approaching to famine, and were it not for the continued importation of the necessaries of life, the inhabitants must either starve or leave the island; this has been occasioned by the mania for sulphur mining, in order to put a stop to this and divert the minds of his Sicilian subjects into a proper channel, his Neapolitan Majesty entered into the famous contract with Taix and Co., which raised the ire of the British Government, who compelled him to withdraw it, and make compensation to British merchants for their loss of trade in sulphur. All that he feared has, it appears, now come to pass, and the inhabitants are in a most deplorable state.—*Mining Journal, April* 27.

DISCOVERY OF COAL MINES IN RUSSIA.

There have recently been discovered in the immediate vicinity of Moscow and the central part of the empire, some very extensive coal formations, which will, probably, soon exercise a very important influence upon the manufacturing and industrial interests of Russia. Moscow, Kalonga, &c., are the chief seats of the rapidly increasing cotton, woollen, and silk manufactures; and in Tula are to be found those imperial and other vast iron works, cannon foundries, and hard-ware manufactures which constitute that special locality, the Birmingham and Sheffield of Russia. The anticipations which are indulged in in consequence of these discoveries should be regarded as premonitory of the importance of cherishing our home and colonial markets more anxiously, and of vigilantly protecting them against foreign invasion.—*Ibid.*

ANTHRACITE.

This is a remarkable species of coal, hitherto but little known in this country as fuel for general purposes. It has been long used in the south of England for drying malt and hops, and in Wales, where the great deposit lies, chiefly in the counties of Pembroke, Carmarthen, and Glamorgan, it is in

general use, and preferred by the inhabitants, who have become habituated to its peculiarities and understand the management of it, on account of its cleanliness and freedom from soot and smoke. It is the most abundant coal in America, where it is used as fuel in steam boats, locomotive engines, for general manufacturing purposes, and household fires. The chief peculiarity of anthracite consists in the absence of bitumen, being nearly pure carbon, in a very compact solid state, containing no gas, tar, or light volatile particles, the production of smoke or soot from its combustion is quite an impossibility. Some fine specimens of anthracite have been found to contain 96 to 97 per cent. of carbon, and since the diamond is proved to be pure carbon, it becomes a curious subject for inquiry how the extraordinary difference in the appearances of the two bodies arises. A diamond may be regarded as one entire crystalised atom ; a piece of anthracite of the same size as made up of an immense number of minute atoms held together by mechanical means ; the former may be represented by a piece of unbroken glass, the latter as a similar piece of glass pounded down to fine dust, and bound together by cement. There is another curious inquiry connected with this subject—what has caused the difference between anthracite and bituminous coal ? since by close attention to the veins or seams, of coal in South Wales, more particularly in Glamorganshire, the veins or seams, which on the western side of the county are found to be pure anthracite, become bituminous, to a certain extent, on the eastern or north eastern side—that is about Merthyr and Dowlais ; while further eastward, in Monmouthshire, they become highly bituminous Whatever may have been the origin of coal, it seems as if during some convulsion of the strata, the anthracite portion had been subjected to greater heat, or heavier pressure than the bituminous portion, so as either to sublime, or press out, the gaseous or volatile parts, or probably both influences were in operation at the same time, leaving that which was originally the same, two distinctly marked different species at the present day. Various attempts have, from time to time, been made to render anthracite available as fuel for steam engines, for which it must prove highly valuable, more especially for marine purposes, from its great strength, durability, the absence of smoke, its power of resisting the decomposing effects of the atmosphere, or other influences, rendering spontaneous combustion impossible, and the whole quantity shipped to distant stations serviceable ; but hitherto all such attempts have, from some cause or other, failed. A plan is now, however, brought forward, which bids fair to realise this long desired object. It has been patented by Mr. Kymer, who has judiciously placed it in the hands of Messrs. Swayne and Bovil, through whose agency its merits are likely to be fully tested, and the results submitted to the public.—*Ibid, April* 13.

NEW PORTABLE LIFE BOAT.

Captain Cotter, a gentleman at present residing in Paris, has invented a life-boat of entirely new construction, the merits of which are now being tested by the French Board of Admiralty ; it can be taken to pieces in an amazing short time, and is so elastic that, on striking a rock or vessel, it will rebound like a ball, without danger of ejecting the men, and, however it may upset, will always immediately right itself ; its body is made of waterproof and imperishable cloth ; the ribs of oak, and perfectly elastic, laced together like the framework of a coach, and strengthened with strong slips of whalebone ; the deck is of cloth, laced from stem to stern in a manner so as to be perfectly waterproof, and in which openings are made for the rowers to sit with a sort of loose petticoat to buckle tight round the waist of each, and effectually excluding the admission of the water. When on shore it forms a perfect tent, by turning it keel upwards, and is then supported by props to a certain height, for the edges of the cloth just to touch the ground. One of these boats, thirty two feet in length, can save from forty to fifty persons, and, of course, will be highly useful to carry on board ships on long voyages, as well as most efficient to be kept on life-boat stations.—*Ibid.*

EFFECTS OF RAILWAYS ON FOREIGN COMMERCE.

The extraordinary effects of the increased rapidity of transit secured by the railroad system, not only as merely shortening the distance from town to town, but even on our commercial relations with the continent, are fully ex-

emplified in some alterations which are about being made in the conveyance of a staple commodity of one of the midland counties—viz., salt. The saliferous district of Cheshire, Nantwich, Droitwich, &c., produces more of this necessary article than any other salt mines, we believe, in the world, and it has hitherto been principally exported from Liverpool, continental vessels coming in ballast for the purpose. By the now full developement of the railways through the midland and northern counties, arrangements are being made to transmit the salt by canal to Manchester, and thence by the Manchester and Leeds, Leeds and Selby, and Selby and Hull Railways, to the latter place for shipment, thus not only shortening the time to the Baltic about one-half, but the great probability is, that vessels which now come in ballast, owing to the length of the voyage round the Channel, will, in future bring cargoes of grain, and thus cause an interchange of two great necessary commodities. One large wholesale house at Liverpool has already an establishment at Hull, and 300 waggons are building expressly for the purpose. It is also probable that Welsh slates, and other articles of commerce, will find their way across the island for shipment from our eastern ports.—*Mining Journal, April* 13.

ARTESIAN WELL IN EGYPT.

The Pacha has ordered an Artesian well to be bored between Suez and Cairo, which, when accomplished, according to the calculations made, will be 1500 feet in depth. The implements for the work are now being prepared in England.—*Ibid, April* 20.

THE SECRETS OF VENTILATION.

Let the air enter the house freely by a large aperture, like a common window, and capable of regulation in the same way. Let it enter a stove room, and be there completely warmed, then let it pass freely through the whole house, and enter all the apartments either at the doors or by express channels. Take off the used air by the chimney and an open fire; or, for crowds, provide larger and express openings—there is no more to be done. Houses that have been ventilated in this simple, unpretending, unmysterious manner, are the best ventilated we have ever entered. It is too often the fate of the mysterious little pipes, funnels, tubes, and valves by which ventilation is frequently symbolised, rather to indicate ventilation than to effect it.—*Illustrations of the Theory of Ventilation.*—[We believe this principle has been adopted by Mr. Moxhay, at the Hall of Commerce, with perfect success.]

THE COPPER BALLOON.

The constructor of this huge work (which is completely composed of sheets of copper, the 200th part of an inch in thickness) is M. Marey Monge and should his anticipations be realised as to the practicability of employing this balloon for purely scientific purposes—as an electrical and magnetic phenomena —M. Arago will introduce it to the French Institute. The idea of the construction of a metal balloon originated with Lans in 1760; and subsequently, in 1784, another metal balloon was constructed by Guyton de Morveau. In the present balloon, the sheets of copper, united by bands, like the ribs of a melon, have been soldered by De Richemont's *autogenous* process; they occupy an extent of about 1500 yards. The balloon itself is about ten yards in diameter, and weighs 800 lbs., and will contain 100 lbs. of hydrogen gas. It is stated in the Parisian journals, that M. Dupuis Delcourt, the celebrated French æronaut, will shortly make an ascent in this balloon. The main object proposed by its constructor, M. Marey Monge, is the power of directing balloons by a system which he has developed in a memoir submitted to the French Academy. One of the advantages gained by the substitution of copper for silk, or other fibrous material, is that the metal will prevent the escape of gas, so that the æronaut may remain a long time in the air, and thus be enabled to study the constant atmospheric currents. It is likewise proposed to employ this balloon in deciding whether it is possible to prevent *hail*, which is due to the electricity of the clouds. Thus, as the balloon may be kept suspended a long time in the atmosphere, if it were connected with the earth by a metal wire, it would thus conduct the electricity from the clouds, and thereby prevent the formation of hail, so destructive to agriculture. This idea of rendering a balloon a *paragrele* is ingenious enough, and we shall be happy to witness its execution. Never-

theless, we have yet to learn the advantage of metal over varnished silk, which has been brought to great perfection in this country, by our veteran æronaut, Mr. Green, in the construction of his balloons.—*Mining Journal, Apr.* 6.

PROGRESS OF AMERICAN MANUFACTURES.

In Simmonds's *Colonial Magazine*, for the last month, will be found proofs of the untiring enterprise and industry of the Americans, which go far to prove the energy and perseverance they are bestowing upon the improvement and progress of new manufactures, as may be seen in these paragraphs culled from the journals of the United States.

Clocks.—A correspondent of the *Hartford Journal*, from Bristol writes "The amount of capital employed in this branch alone is some three or four hundred thousand dollars, and the business gives employment to nearly four hundred mechanics. The manufacture of clocks has greatly increased within the last five years, although for fifteen years prior probably one million were made and profitably disposed of. We have every facility for manufacturing, and the vast improvements recently effected in machinery have done wonders for the business. The division of labour is well understood, and carried out to a nicety, otherwise it would be impossible to manufacture and afford brass mahogany cased clocks for the low price of three, four, or five dollars each, which is now done. More than ten thousand have been sent to England alone within the last eighteen months.

According to the *Newark Advertiser*, the number of wooden clocks manufactured in Connecticut last year was five hundred thousand. The number will be greatly increased this year, in consequence of a foreign demand. Within an hour's ride of Hartford, a thousand clocks are finished daily.

Needles—A correspondent of the *Rochester Democrat* thus describes a factory to make needles, established at Haverstraw, Rockland County, New York. "I saw needles in various stages of the process by which they are made from the wire, prepared on the same premises The wire is at first cut into lengths which will make two needles each. The depressions where the eyes are to be made, and where the grooves are to be found on the finished articles, are stamped in both needles by a single stroke of the machine, with which a single hand can turn off thirty thousand in a day. It is then turned over to another boy, who with a machine punches the eyes, and another separates the two needles, and smoothes away any irregularities. The eye of the needle is then bored by another process, which renders it so smooth that it will not cut the thread. After this, a man grinds a handful at a time on a common grindstone, holding them in his left hand, and giving them perpetual rotary motion with the right, so that they are made round and sharp. They are now to be 'case hardened' and finally burnished, all of which is done by simple processes, in which immense numbers can be subjected to the operation at the same time."

Pins.—The new tariff imposed for the first time a decidedly protective duty on pins, equal to fifty per cent. There were but two pin-making establishments in the country when the law was passed, each of which had been carried on for years without making a single dividend; one certainly had made none. Since then this concern has paid its first dividend of two and a half per cent.—the sole return on a nine years' investment—and is now driving a good business, and likely to do well. It is selling pins fifteen per cent. cheaper than it did before the tariff was passed, and making a vastly superior article

"We are informed," says the *New York Evening Post*, "that but a small quantity of English pins are imported, and only about fifteen cases were passed through the custom house this season. In consequence of this, the demand for American pins has greatly increased.

American Bunting is now made at Framingham, Mass., 500 yards daily, quite equal to the foreign article. Heretofore all the bunting under which the American navy has fought, and which has been displayed by their merchant vessels, has been the manufacture of foreign countries.

Match Making.—This business is said to be now worth 1,000,000 dollars in the United States. A few years since they were all imported from Europe. Now the Americans export several hundred thousand dollars' worth to the West Indies and South America.

METEOROLOGICAL REGISTER KEPT AT DINAPORE, SEPTEMBER 1843.

Days.	Moon's Changes.	Self registering Thermometer. Minimum.	Thermometer, in the shade. Sunrise.	9 A. M.	Noon.	3 P. M.	9 P. M.	Daily range of Thermometer.	Difference between wet and dry bulb Thermometer. 9 A. M	3 P. M	Rain, in inches.	Winds. A. M.	P. M.	Remarks. Night.	A. M.	P. M.
1		80·6	81·4	84	87	89·5	85	8·9	4·5	10	0·01	E.	E. strong.	Fine.	Cloudy.	Light clouds.
2	☽	80·7	81·7	87·2	89.8	91·5	87 5	10·8	6·5	11		,	,, ,,	,,	Light clouds	Ditto.
3		81·4	82	87 7	90 7	91·8	87 6	10 4	7	11·5	0 01	,,	,, ,,	Thunder st.	Ditto.	Ditto.
4		80 8	81·3	85·3	88·4	90·8	84 2	10	6	11·5	..	,, strong	,, ,,	Fine.	Cloudy.	Ditto.
5		80 5	81·3	85·3	88	89 4	83	8·9	6 5	10	..	,,	,, ,,	,,	Ditto.	Dark & cloudy.
6		79·8	80·7	82 8	86 4	89	83·5	9·2	3·5	10	..	,,	,, ,,	,,	Dark, cloud.	Cloudy.
7		80·5	81·4	84	87·8	88·9	83	8·4	3 5	7	..	,,	,, ,,	,,	Ditto.	Ditto.
8		75·8	80·5	83 6	84.5	82·3	80·7	8·7	3	2·5	0 75	W. light.	W. light	Thun. st. r.	Ditto.	Thun. st. rain.
9	○	79	79·7	82·8	85·3	84·8	80·8	6·3	2 5	3·5	0·01	N. Ditto.	,, ,,	Heavy dew.	Ditto.	Cloudy,
10		77·2	78·1	82·6	84·6	83·5	81·2	7 4	3 5	4 5	0·08	N. W.	N. W. ,,	Ditto.	Ditto.	Dark & cloudy
11		76·4	77.2	83	84·7	85.8	83 8	9·4	4	7 5	..	N. W.	,, ,,	Ditto.	Light clouds.	Light clouds,
12		78·1	78·5	84.4	85	86.7	79·4	8·6	4	7	..	,, light.	,, ,,light	Ditto.	Cloudy.	Thun.st.cloudy
13		72	74·3	76 7	81·7	82·7	80 2	10.7	2	4	3 27	,	,, ,,	Thun. st.r.	R. till 10 a. m.	C. & dark,
14		77	77·9	81·5	83	85	80	8	3	4·5		N. S. W	W.	Heavy dew.	Dark Cloudy.	Ditto, Ditto,
15		77	78	82·7	84	84·4	81·8	7·4	4	4·5		W N W light	N. light.	Ditto.	Ditto,	Light clouds.
16		78	78·7	82·1	84	85·3	81·1	7 3	3 5	6		W. light.	W.	Ditto.	Ditto,	Ditto.
17	☾	78·5	79·3	84	86	87·7	82·7	9·2	4	7		W. light	N. W.	Ditto.	Light clouds.	
18		78	78 6	84·5	87	88 4	82·4	10·4	5	9·5		W.	,,	Ditto.	Clear fine.	,,
19		77·4	78	84·4	86·4	87·8	82 4	10 4	5·5	9		N. W.	,,	Ditto.	Ditto,	,,
20		78·8	79.3	84·4	..	88·2	..	9 4	6 5	9		W. light	,, light,	Ditto.	Ditto.	,,
21		79·5	80	84	88·4	89.4	83 7	9·9	7	10		,,	,,	Ditto.	Ditto.	,,
22		79.5	79·8	84 6	89	89 7	82	10 2	7	10		,,	,,	Ditto.	Ditto.	,,
23		79.1	79·8	84·5	89·4	89·7	83 5	10 6	7	10		,,	,,	Ditto.	Ditto.	,,
24	●	77·1	77·5	84·6	88·4	89·4	81·5	12·3	6	11		,,	,,	Ditto.	Ditto.	,,
25		75·4	76 4	84·5	88·2	89.7	81 8	14·3	7	10		,,	,,	Ditto.	Ditto.	,,
26		76 2	78·2	84 3	88	89·2	79·7	13	8	15		,,	,,	Ditto.	Ditto.	,,
27		73·4	74	84 5	87·5	88·4	82 3	15	6	11·5		,,	N. ,,	Ditto.	Ditto.	,,
28		77	78	84·7	87·5	88 9	82	11·9	7	11		N. E. light.	N E. squally	Ditto.	Ditto.	,,
29		77 8	78 5	82	84 8	87·3	83·7	9·5	4	9		E.	E.	Ditto.	Cloudy.	,,
30	☽	77 8	78·2	85	86 4	87·8	83·1	10	6·5	11		E.	N. E.	Ditto.	Light Ditto.	,,
Mean		78·0	78·9	83 8	86·6	87·7	82 5	9·8	5·1	8 6						

Minimum........ .... 78·0
Medium...... .... 82 5
Maximum,....... ...... 87·7
Of all hours...... ...... 82·9

Mean. Difference of wet and dry Bulb Thermometers ... 6·8
Temperature for Quarter 83·8
Total Rain in inches.. .. 4 16.

S. M. Ll.

Dinapore, 2nd Oct, 1843.

-James Appolly-

THE

INDIA REVIEW.

OCTOBER.] —o— [1843.

BIOGRAPHICAL SKETCHES.

Captain James Abbott,

Bengal Artillery.

(WITH PORTRAIT.)

CAPTAIN James Abbott, whose portrait is prefixed to our present number, is one of those officers in the Honourable East India Company's Service, whom the recent exciting operations beyond the Indus brought prominently before the public, and afforded him an opportunity of distinguishing himself in no ordinary degree. In attempting to give a sketch of his public career, we have great cause to regret the small means afforded us, by the scanty materials before us, to do him justice. With the exception of a few dates, arranged chronologically, and the two volumes which he has given to the public, detailing many of the personal incidents which befell him, in his journey to Khiva and thence to Petersburg, we have absolutely nothing whereon to erect the fabric of a memoir. In these circumstances, we feel that it is scarcely possible rightly to pourtray the character, and exhibit the energy and abilities of the man, who, while only a subaltern officer in the Bengal Artillery, carried out fully and successfully the purposes of a political Mission of no ordinary delicacy, and difficulty ; and for the management of which, had it proceeded from the court of St. James, there would have been a diplomatic corps, marching forth with all the parade of high sounding official titles, and the pomp and circumstance which usually accompany the diplomatic agents of a great country, holding political ascendancy among the other nations of the earth, and sending forth her emissaries, bearing significant insignia of her power, to the ends of the earth. But we will not anticipate the natural order of events in the short memoir which our scanty materials enable us to give.

On the anniversary of the battle of Waterloo in 1823, the subject of our memoir passed his examinations at Addiscombe, for the Honourable Company's Artillery, and, being appointed to Bengal, almost immediately sailed for Calcutta. He arrived in the Capital of British India, on the 28th of December in the same year. It does not appear that he had any share in the stirring events of the Burmese war. But we find him serving at the siege and capture of Bhurtpore in 1825-6.

Few of our readers, we presume, need be told the importance and the difficulty of the operations before that renowned fortress. Already, on a former occasion, had a British force, commanded by the victorious and gallant Lake, sat down before it. But the timely intervention of a treaty had left the result of the siege a matter of uncertainty. The undeniable fact, however, that Lord Lake's troops had repeatedly been repulsed, after being very severely handled, in the siege of 1805, increased the fame of that celebrated strong-hold; and the prevailing idea, among the warlike tribes of Upper India, was that, even though assailed by a British force, the fortress was impregnable. It is well known what effect is produced upon the minds of the soldiery, simply by the reputation which the place assailed happens to possess. And should the mode of conducting the defence, or the ineffectiveness of the assault be such as for a time to strengthen the impression already existing, the consequences are likely to be strongly in favour of the defenders. It is well known that while a native battalion in Lord Lake's force boldly faced the foe, in the partial breach which had been effected, two British Regiments renowned in the preceding contests, for steady courage, and deeds of gallantry, recoiled from the deadly struggle. In such a crisis, the officers have the brunt to bear. But the expostulations, nay almost reproaches, of the gallant Lake himself were needed to bring the 75th and 76th Regiments to a sense of duty. They did what brave men could do, in a subsequent attack; and the heaps of their dead which lay in the breach at Bhurtpur, shewed the determination of the British troops to regain their character; but yet the final repulse of the remainder furnished an equally manifest proof of the formidable nature of the place assailed, and of the fact that the besieged knew how to defend a breach, even at the point of British bayonets. Upon the whole, the treaty, and final withdrawment of Lord Lake, after the brilliant and victorious achievements which had marked his career, contributed to foster the idea in the native mind that Bhurtpur was impregnable. The charm had to be broken; and this fell to the lot of Lord Combermere and his force, in 1826. The mud walls, sixty feet thick, and therefore setting at nought all attempts to breach them by the common operations of artillery, were successfully assailed by miners, and a practicable breach effected on the 17th January, 1826. Next morning the place was carried, after a vigorous contest of two hours, in which many of the veterans who had successfully contended there in 1805, again distinguished themselves. We are not in possession of documents, to show to what extent the subject of our memoir was engaged in this brilliant but sanguinary action. But we know that the arm of the service to which he belongs must have been most actively engaged, ere the guns of Bhurtpur could have been silenced. This we suppose to have been his maiden field; and we know of no other occasion on which he was called upon to engage in actual military service, until the formation, twelve years subsequently, of the army of the Indus. During nine years of the interval, he seems to have spent his time chiefly, in the otium of military cantonments, occasionally employing his pen in poetical compositions of considerable merit. In October, 1835, we find his abilities called into operation, in an important, although non-professional, branch of the public service. At that date

he was appointed an assistant to the Revenue Surveyor, in the North-west Provinces; and four months afterwards, in February, 1836, he received charge of the Saheswan Revenue Survey, and surveyed the whole of the Shahjehanpoor District and part of Bareilly.

Lord Auckland, in process of time, published his well known manifesto against the Ameer Dost Mahammad Khan, setting forth the necessity of reinstating on the throne of Affghanistan Shah Sujah-ul-Mulk, the steady friend and ally of the British Government. Such a scheme could be effected only by dethroning Dost Mahammad Khan, the *de facto* ruler of the Affghan tribes. And as he was accused of forming an anti-British alliance, and of favouring a policy which might ultimately place the entrance to British India, from the side of central Asia, in the hands of the Russians, this formed, in fact, the real ground of making a hostile attack upon his dominions. At all events the parties then in power, both at home and in India, determined to make Affghanistan the scene of war. The army of the Indus was summoned to assemble at Ferozepore; and Lieutenant Abbott was recalled from his surveying appointment to join that force. He marched with the army from Shikarpore, and shared in all the fatigues and molestations of conducting artillery along the defiles of Beloochistan, and through the Bolan pass. At length, after much suffering, arising from fatigue and privation, and the harassing nature of desultory mountain skirmishing, the army of the Indus, with jaded horses, and without many of its commissariat camels, arrived in somewhat humble plight, at the city of Kandahar; and, if there was no joyous burst of enthusiasm greeting the puppet-king, on his arrival in the second city of his kingdom, there was as little fighting; for the invading army quietly occupied the city, and, after some royal parade in honour of the restored monarch, the main force marched for Ghuzni and Cabul, leaving a garrison in Kandahar, of which Lieutenant Abbott's company formed a part.

Here he remained for a short time; and, had another appointment not awaited him, he might ultimately have shared in the triumphs of the force under the command of the late distinguished Sir William Nott, who, during the trying results of the insurrection at Cabul, maintained his position at Kandahar, with equal honour to himself, and the well disciplined force under his command; and not only so, but was ready to act, with equal power and efficiency, on the offensive, when the requisite authority, or rather permission, to do so, had been obtained. In fact Lord Keane of Ghuzni, instead of terminating the war in Affghanistan, scarcely did more than superintend the operations connected with the beginning of it. Those who succeeded him, in holding command, in what was deemed by some a conquered and pacified country, had the chief difficulties to contend with. And, we may be permitted to add, that, in our humble opinion, the actions of Nott, of Pollock and of Sale, during the latter period of our connection with Affghanistan, especially those of Nott, cast the achievements of the Baron of Ghuzni completely into the shade. Nott, maintained, to the last, his province of Kandahar,—became the second European captor of Ghuzni,—and would in like manner have occupied Cabul had he not been anticipated by the march of Pollock's force to

that city. But, be these things as they may, the subject of our memoir was not permitted to share in the labours of those whose duty it was to support the tottering throne of the ill-fated Shah Sujah. Another sphere awaited him. The splendid achievements of the ill-requited Eldred Pottinger had saved Herat from falling into the hands of the Persians ; and the circumstances of the time induced the Supreme Government to resolve upon sending a special envoy to that city. This high appointment was conferred upon Major Todd, and Lieutenant Abbott was chosen as his assistant. This appointment took place in May, 1839, and towards the close of the same year, the Russian invasion of Khiva, led the envoy at Herat to take measures for opening a friendly communication with the Court of the Khan Huzurut, or Supreme Lord of Khiva, otherwise styled, "Father of the conqueror of Heroes, the Father of Victory, the King of Khaurism." This tender of British friendship was well received, and an ambassador, from the Court of Khaurism to the Government of India, was despatched from Khiva to Herat. In reply to the communications made by that functionary, the envoy judged it proper to depute his assistant, as representative of the British Government at the Court of the Khan Huzurut. Accordingly, after having been about six months at Herat, Captain Abbott left it, on the 24th December, 1839, accompanied by an escort of Affghans, of whom the leader was the secret tool of the infamous Vuzeer of Herat, and sent with Captain Abbott, apparently with the sole intent of doing all in his power to defeat the purpose of the Mission. So soon, however as the true character of the man was suspected, notwithstanding his engaging manners, and constant endeavours to ingratiate himself, Captain Abbott resolved to get rid of him as soon as he possibly could ; consequently, having the option of dismissing or retaining him after his arrival at Merv, he resolved on adopting the former expedient, and carried it into effect. The dismission of this man did not however rid our traveller and ambassador of the sinister attempts and treacherous workings of the ruling spirit at Herat ; and in the first instance the dismission of the gay, handsome and polite Peer Mahammad Khan was a felt loss.

It is a long and dreary march, especially in the winter season, from Herat to Khiva. The distance is about 600 miles, and a great part of the way is along a barren steppe, where scarcely a human being or a tent is to be seen. The journey occupied Captain Abbott from the 24th December to the 19th of the following January. It would serve no good purpose to dwell upon this route, but in order that the reader may comprehend the nature of such a journey, we beg to present him with the following account of a day's trip in the words of the traveller :—(vol. I. pp. 56—60.)

It is needless to detail each several stage, where all were precisely alike ; but it may be interesting to sketch a single day's trip, with all its pleasures and inconveniences. I rise, then, at midnight, and sit at a blazing fire, sipping tea without milk, until the camels are laden and have started. I then mount and follow them, and as camels walk something less than three miles an hour, soon overtake them. As the cold is intense, and our feet are by this time fully numbed, I alight and spread my carpet, and a large fire is soon made, around which we all sit half an hour. Wood is very abundant, and so dry that when the hoar frost or

snow is shaken from it, it kindles instantly. It is likewise so deficient in solidity, that a stem, the thickness of a man's body, is torn up by the roots without difficulty.

We now mount again, and proceed in silence, for the path admits not of two abreast, and the freezing of the vapour of the breath, upon one's beard and mustachios, renders the motion of the jaw singularly unpleasant. Indeed, in raising the handkerchief to one's face, it is tangled in a disagreeable manner with the crystals, and the chin has become so brittle, that a very slight titilation is painful. Jupiter is now far above the horizon, and Venus is shining gloriously upon the desolate wild. And by degrees we perceive the day itself slightly winking in the east, and again we pull up, to light a fire, and to thaw our frozen extremities. We sit until day is fully confirmed, when the Birdler Beeg and my Meerza, and sometimes Summud Khaun spread their cloaks, ascertain the true position of Mecca, and duly say their prayers. The other servants do not seem to think the ceremony expected from them, as they have less title to consequence. One, day, when Birdler Beeg and the Meerza had both risen from their knees and were approaching the fire, the Meerza said to the Toorcumun, "Salaam alikoom," which was as much as to say, I hail you a brother. The other however did not condescend to answer the salutation, thinking himself far too orthodox to own such fraternity. I have witnessed the same scene acted over a purer faith, and in a better land. The High Churchman speaks with infinite scorn of the humble Methodist, the zealous puritan. The very enthusiast, upright of heart and gentle of spirit, whose words are sincerity, whose soul glows with the least earthly love, yet deems himself entitled to speak of "poor dear such an one," and to mourn the condition of many a perverse brother and sister, over whom, perchance, the angels are rejoicing.

When shall we behold the bequest of Jesus pervading the hearts, and directing the conduct of all? When shall we see the will to do good, divested of the proneness to think evil of our neighbours? If indeed so great a blessing is yet in reserve for man's perverted race, the prayer which those pure lips have taught us, will be robbed of its foremost petition. The kingdom of Heaven will be amongst us, and the hope of it shall be swallowed up in sight.

Ere the sun breaks from the horizon, we are once more mounted and away. The profusion of hoar frost upon the leafless jungle sheds a glory over the desolate scene. It is a sight unwitnessed by me for seventeen years, and brings back many pleasant remembrances tinged with sadness. Now we are close upon the traces of the camels. The slave caravans keep them company. The hardy Toorcumuns, as they trudge along in their clouted, laced boots, and legs wound around with woollen cloths, and their white sheepskin caps heavy with hoar frost, have no cause to envy us, whose knees are cramped with the saddle, and whose feet are again freezing in the morning air. How frosty their cheeks and sharp noses appear, peeping above the cataract of ice which clings to their scanty beards, and below the snowy mass which overhangs their brows. The captive ladies are wisely invisible. They have tucked themselves below the felts of their Kujawurs, and yet I fear, in spite of all their management, have but a chilly berth. But there is one poor wretch, who has no such defence against the weather. Whose knees, like ours, are cramped with the saddle of her camel; but who has not like us, a sufficiency of clothing, nor the option of alighting to renew life at the fire. What is her condition, and what the hope which supports her under her misery? Is it hope of escape? Alas! he who once enters Khiva abandons all such hope, as surely as he who enters hell. His prison-house is girdled with trackless deserts, whose sole inhabitants are the sellers of human flesh; escape is as impossible from Khiva, as to the wretch thrice-girdled in the black folds of Styx. If she has still a hope left to support her spirit, it is the chance, faint and dim, of falling into hands less cruel than those which now oppress her. Her home, her country, her husband, her friends are lost and for ever, and the child which hangs like some worthless article of merchandise from the camel's side, shall, if it continue to live, know neither home, nor country, nor one right that should be common to the human race.

The magnificent camels, in their long shaggy fur, little heed the weather. The icicles hang from their beards, and hoar frost garnishes their heads. Their large, full, lustrous eyes, seem acquainted with hardship, but not with trouble.

They are the very philosophers of patience, who conquer all things by tranquillity of spirit. Many a "Salaam alikoom" is wished me as I pass, and Birdler Beeg has just stopped to take a puff of the kullyaun, and exchange a light-hearted laugh with his countrymen. On we march with lengthened pace, and at ten o'clock strike off the road to seek a hollow, convenient for a halt. We choose that which is sheltered from the wind and exposed to the sun, and has, besides, an abundance of fire-wood; as for camel thorn, there is never lack of that. My carpet is spread, and Shakespeare is open, and this is real enjoyment; for the cramped limbs may now extend themselves, and the warmth of the sun and of the fire are equally agreeable. But this is not all, for the camels have now arrived, and I see Nizaum, my Nazir, under way to my carpet, bearing hot bread and the concreted juice of grapes; and having been nine hours in the frosty air, the appetite is something whetted. My people also have made themselves tea, and a stew swimming in the fat of ram's tails; and leaving Byron to sing, "The *Isles* of grease, the *Isles* of grease," they swallow whole *continents* at a gulp. By degrees the warmth and ease of my position "steal my senses, shut my sight," and I am not sensible of external objects, until the loud "Bismillah" awakens me to see the caufila depart.

Then it is once more "Mount and go," nor do we draw rein until four o'clock, when we again choose a position of bivouac and collect fire-wood for the night. Again come the camels, and now my funny little tent is pitched, and I install myself within it; in due time devour the fat stew they have made me, and sleep until midnight; when I rise, and call the people who have crept under their thick felt coverings, and are well wrapped in furs.

Such is a life in the wilderness, sufficiently tedious and irksome at first, and painful until habit has accustomed the limbs to the constraint of the saddle, for so many hours daily. This constrained posture, aided by the excessive cold, so paralysed the nerves of the legs, that for twenty days after my arrival at Khiva I had scarcely the use of my right foot, and all my servants complained of constant pain in the extremities. Unfortunately my old Meerza having lost just forty of the two and thirty teeth he once boasted, and having moreover an all-of-a-heap manner of speaking, so that the first word of his sentence runs down the heels of the last, all conversation with him is out of the question: and Birdler Beeg understands just enough of Persian to misinterpret mine, I therefore feel doubly the loss of Peer Muhummud Khaun, who spoke the language well, and caught my meaning readily.

After a journey in this fashion for upwards of three weeks, our traveller neared the capital of Khaurism, and sent on his guide to announce his arrival, taking lodging for the night at a hospitable dwelling, upwards of two miles from the town. The Khan, on hearing of his arrival, decreed that he should be received with distinction, appointed that one of the Royal mansions should be set apart for his accommodation, and that a guard of horsemen, followed by the master of ceremonies accompanied by a troop of 100 more horsemen, should go forth to escort the foreign ambassador into the capital. The ambassador, after exciting great curiosity and being gazed on by young and old of both sexes, as he passed along, soon reached his quarters, where he made himself as comfortable as circumstances enabled him to do. But many of our readers will be somewhat astonished to learn that the so-called palace, in which he was requested to make his abode, was an uncouth dwelling, large indeed, but having "miserable rooms, ill-shaped, ill-proportioned, unfloored, unplastered, and having neither window nor chimney." One of the floors was however covered with felt. An officer was in waiting to make arrangements with the guest, as to whether his allowance should be given in money or in kind. This important matter being settled, by Captain Abbott's announcing his readiness either to purchase provisions for himself from his own funds, or to receive them as a compliment from the

Khan Huzurut, if His Majesty thought fit to send them, the ambassador was left for a time to repose from the fatigues of his journey. When an audience was given, the ambassador was received with due respect, but subjected to various difficulties, on account of his ignorance of the language of the country, and his imperfect knowledge of the only other language, whereby his ideas could be communicated to His Majesty. Persian was the language employed, but both the speaker and the interpreter knew it equally imperfectly, and spoke with accents widely different. The audience took place in the royal black tent which was pitched in a small court of the palace, the only access to which was a series of long passages crowded with guards. The tent "was of the usual dimensions, about 24 feet in diameter," without ornament of any kind, "its sole furniture being the carpet and cushions, on which he (the King) reclined."

Captain Abbott was not at liberty to disclose the politics of his mission, but the great reason of his visit to Khiva is well known. The Russian Government had resolved to vindicate the cause of its subjects, detained in captivity within the realm of Khaurism. It was known that the Russians either had invaded or were about to invade the Khan Huzurut's dominions. Could a mutual release of prisoners be effected, all reason why a Russian force should penetrate, with hostile intentions, into Central Asia, would be entirely removed—Something like a mediation between the Russian and Khivan Governments must be attempted; and Captain Abbott laboured to get the Khan Huzurut to consent unconditionally to an exchange of prisoners. He was at length completely successful, but not without much tedious negotiation, and much manifestation of suspicion and ignorance, and misinformation on the part of the king and his advisers. For instance, it was no easy matter to establish the fact that an Englishman was not a Russian; for, at one time the common belief at Khiva was that the English were a petty tribe of Russians. The consequence was that, as an avowed envoy from the British embassy at Herat, our traveller was in fact suspected of being a spy, endeavouring by false pretences to further the interests of the invaders of Khaurism. Undoubtedly misrepresentations had been conveyed to Khiva. The whole narrative exhibits manifestations of some secret machinations between the notorious Yar Mahammad of Herat, and the *worthy* mehtur, or prime minister, of Khiva. The Heratian minister has been designated, we suppose with accuracy, "the most accomplished scoundrel, in central Asia." We cannot, however, accord even this meed of praise to the mehtur of Khiva. He appears to have been a low, sneaking, avaricious and selfish person, with small talent and a plentiful supply of insolence. With such a character there was much need for patient forbearance, and our ambassador seems to have put up with such a very large amount of insolence, as in other circumstances could not have been allowed to pass unexplained. But, as was prudent and right, much of what passed was ascribed to sheer ignorance, and therefore disregarded as unworthy of notice. The artillery officer was however brought to a dead stand one day, by the prime minister of Khaurism flatly telling him, when reminded of an unfulfilled promise, that *he lied.* This was rather unqualified, and not, very capa-

ble of being explained, even in a Pickwickian sense. Captain Abbott, accordingly, told the offender, though he happened to be in that individual's palace, in the strongest language that could be used by a gentleman to a gentleman, that he would not brook such conduct; that should it recur, he should insist upon the most ample reparation, or resign his office at that Court; and that if he overlooked it in the present instance, it was only in consideration of the ignorance of the person venturing upon such conduct. Having said so he walked out of the house, mounted his horse, and rode home.

The Khan Huzurut appears in a much more favourable light than his minister. He seems to have acted with much more candour and sincerity, and to have been rather gratified than otherwise at the presence of a British envoy proffering the mediation of his nation between the two contending powers. He not only agreed to deliver up the Russian captives, provided his own subjects were released; but he even expressed his readiness to send them all to Russia, provided a hostage were left with him, as a pledge that his subjects would be released. But more than this, the Khan, in honour of Her Majesty the Queen of Great Britain, released at the special intercession of Captain Abbott, twenty-two Affghan females, promising to send them whithersoever the Ambassador should choose to name, whether that should be Calcutta or London.

After the negotiation regarding the slaves had been completed, and after it had been settled that Captain Abbott should proceed to Petersburg to lay the negotiation before the Russian Government, the chief difficulty was the fixing of a route. At first Captain Abbott thought of going direct from Khiva to Orenberg. The great difficulty in such a route, he found to be, that the road could not be practicable, on account of snow, till late in the season. Besides this, Captain Abbott learned that one guide would not be able to conduct him all the way to the Russian Camp; but, on the contrary, that he must be given over into the hands of two or three others who might, or might not, respect the authority of the Khan Huzurut. Not only would great delay be the consequence, but great danger might result from the cupidity of the parties to whom his safety would be intrusted. He ultimately determined to adopt the route by Mungh Kishlak, whence he supposed he might get by ship to Astrakan. This route the Khan himself recommended as the most suitable; but afterwards both he and his minister eagerly endeavoured to secure the Orenberg route, probably with a view to ensure detection and summary punishment, should the envoy, after all, prove to be a Russian, as certain reports affirmed. Captain Abbott however, held out very firmly; and it was finally arranged that he should set out on the Mungh Kishlak route, under the guidance of an uncouth and not over-polite guide, Hussun Mhatoor, chief of the Chowdhoor Turkomans. The only great difficulty remaining was how to raise the necessary funds. The envoy did not feel himself at liberty to burden the royal treasury with the expenses of a British Ambassador, and to the very last, trusting to the faithless promises of the Mehtur, hoped to raise funds by bills upon the embassy at Herat. This, however, he found it impossible to do. And as a last resource solicited the Khan,

by letter to order the bankers to honour his bills. This only excited His Majesty's resentment, who was offended at the request not having been made at the last audience. A letter of explanation, sent afterwards, was not answered. The Envoy was justly indignant at this ungenerous and inhospitable treatment. But there was no other resource, beyond the expectation of selling his horses and other property on the route, or on the shores of the Caspian. He accordingly prepared to depart, under vivid conceptions of the dangers and difficulties that might accrue in consequence of the want of funds; but borne on by a sense of duty, and the hope of effectually removing all just pretexts on the part of the Russians for marching into Central Asia.

Before departing, the Envoy had, for his silver watch, redeemed from the Mehtur, Ummeer Beg, who, while carrying despatches from Colonel Stoddart, when at Herát, for the British Ambassador at Teherán, had been taken captive by Turkomans, and carried to Khiva, where he had been sold into slavery, and after having escaped, had been caught in the desert, brought back to Khiva, and mutilated as to his ears, by order of the Mehtur. Nothing could exceed the gratitude of the ransomed captive, who avowed his purpose of following his deliverer to the ends of the earth. Captain Abbott, however, felt constrained to decline this offer of Ummeer Beg's services, and was greatly mortified that he had not sufficient funds at command, to enable him to reward adequately one who had endangered his life in the service of the British Government. Nor did Captain Abbott overlook the case of the unfortunate Stoddart. The Khan Huzurut seems to have greatly desired to procure Stoddart's liberty, but his attempt was unavailing.

The journey across the steppe to the Caspian afforded several opportunities for the manifestation of character. The guide Hussun, proved a most stubborn, intractable sort of person, marching just when he thought fit, and in various ways annoying his charge. The Ambassador and his suite left Khiva about the middle of March 1840, after having been delayed there for nearly two months. He at length arrived on the shores of the Caspian, April 12th; but what was his disappointment to find no ship at Mungh Kishlak; and after waiting there for some days all chance of descrying any was given up. We shall allow Captain Abbott to describe in his own words, his approach to and arrival on the Caspian :—

April 12th.—I was now close to that Caspian, so long and earnestly desired, which had seemed to recede from me, in proportion as I advanced. The rich Kuzzuk, whose tent was at hand, sold me a sheep, which was a welcome addition to our almost exhausted supplies. I sent for Hussun Mhatoor, and desired him to find for me some camping ground, upon the brink of the sea. He said, that the Russians frequently land there, and massacre all whom they meet; that he dared not encamp there. and that if I was determined upon it, he must separate from me, and could afford me no protection. That he would choose, for me, the nearest safe neighbourhood to the landing place, and that I could ride thence, as often as I pleased, to visit the coast. To separate from Hussun, I knew to be destruction, so I was obliged to comply with a measure, to which I was extremely averse. At the distance, therefore, of three miles from the Caspian, I occupied a spot selected by Hussun, and leaving there my baggage, rode with him and a few of my suit to the landing place. We proceeded over a high, irregular plain

and at length came in sight of the wide expanse of blue waters, from the edge of a cliff, of some 700 feet.

I cast my eye over the waste of waters, and perused most anxiously the line of coast : but not a vessel was in sight. Again and again, I explored the long desired Caspian, and again my eye, wearied and worn out, rested in despair from its wandering. That gaze was one of the most disheartening, the most appalling, my eye had ever known. I enquired of Hussun, what method merchants adopted, to advertise the Russian vessels of their arrival. He replied, that in general, there was no want of boats lying off shore, but that the burning of the Russian fleet, at present deterred them from approaching, and might prevent their visiting the coast at all. I reminded him of the assurance he had made me, in presence of the Khan Huzurut, that I should find abundance of vessels, and no difficulty whatever in embarking, and of his offer to supply me with the use of his own boat. He denied having made this offer, with the utmost effrontery. Said that there was an island, about five hours' sail from shore, at which there were always vessels. He recommended me to sell my horses, and purchase a boat and two Russian slaves to man it. To embark in this boat for the island, and there procure a vessel, for the conveyance of my suite and baggage to Astrakan. This was truly a promising expedient. The sale of my horses would have rendered it impossible for me to return to Khiva, or to proceed to Dahsh Gullah, the Russian fort, should I fail to procure a vessel. Nor was this all; for I was so ill provided with cash, that I depended upon the sale of my horses for the means of prosecuting my journey, and could not afford to part with them, for the mere use of a boat, for a single day. Neither could I venture to quit the coast, without my servants ; as any plausible report of my departure would have been seized, by Hussun, as a plea for plunderiug my goods, and selling my people as slaves; or the governor of the island might detain me, when *their* destruction would be certain. I therefore declined this offer, and told him, that if, next day, no vessel should arrive, I must proceed, as the Khan Huzurut had desired, to Dahsh Gullah.

After some deliberation, Captain Abbott resolved to proceed to Dahsh Gullah ; but nothing could prevail on Hussun Mhatoor to accompany him beyond Mungh Kishlak. In order, therefore to carry out this resolution, he entrusted himself, his attendants and his whole property, to the guidance of a Kuzzak leader named Dana Bae, who was accompanied by his son. Our limits do not permit us to dwell at large on the incidents of this march. Suffice it to say, that our Ambassador very soon found out the true character of his guides, and firmly believed that they sought to draw him into a snare. He acted, in consequence, with as much caution as one could do, while surrounded by men of whose language he was ignorant, and whose means of communication with the surrounding tribes were abundant. The traitorous guides matured their plan, and on the night of 22d April a sudden attack was made upon the party. Captain Abbott was cut down, severely wounded in the hand, one finger being cut off, and another so mutilated as to require amputation so soon as that could be effected. He lay helpless on the ground, and would certainly have been instantly despatched, had it not been for the timely protection spontaneously afforded to him by Cherkush Bae, one of the assailants, who partly, as it would appear, from interested motives, and partly from generous feeling, effectually warded off every other assailant. That the motives which actuated this rude Kuzzak were purely disinterested could scarcely be expected ; and we know as a matter of fact, that promises were made to him, the realization of which depended upon the life of the captive, whom the circumstances of the night-attack had placed in his hands. But be this as it may, the fidelity of Cher-

kush Bae remained unshaken to the very last, and he appears to have done every thing in his power to make the Ambassador comfortable while he remained under his care. He was seconded in all his endeavours by his brother Ahris Mhatoor, whose gigantic frame, and acknowledged prowess, seem to have kept the others in awe. We must refer to the latter part of the 1st volume for a full detail of the anxieties and troubles which filled the mind of our traveller during the days of his captivity. He was placed in most trying circumstances. He was stripped of every thing; nearly all his servants were sold into captivity; and the hope of release seemed distant and uncertain. In such circumstances gloomy thoughts were but too apt to steal into the mind. We cannot always sympathize with our author's state of feeling, nor are we of opinion, that he drew his comfort always from the proper quarter. But we most willingly and sincerely accord to him the praise of having conducted himself, in the difficult and trying circumstances which he experienced, with great presence of mind, and no ordinary fortitude.

The occasional sketches, which are given by the traveller, of the domestic economy, and the habits of the tribes of the desert, are interesting, and illustrative of human nature in one of its peculiar spheres. No less illustrative of man are those different features of mind and character brought into bold relief, in the case of Captain Abbott's attendants, during the attack and the subsequent captivity. The sly cunning of the Asiatic; a strong and abiding love of self, blended with respect and attachment to their master; the dogged fatalism of bigoted Moslems,—all appear amid the exciting and trying events which followed the march from Mungh Kishlak.

The captivity had lasted about seventeen days, and the gloom connected with it was aggravated by the probability that Hussun Mhatoor himself would soon be present, or would execute his purpose by means of his Turkoman agents. There was little probability of release; and, as a cover to their crimes, the prime agents of this unjustifiable treatment,—of one who was not only the guest of their sovereign, but entrusted by him to complete negotiations upon which the safety of the kingdom itself depended,—might in a summary manner obliterate all vestiges of what had taken place, by at once putting the captives to death. But, of a sudden, the gloom was pierced by rays of returning hope. A messenger of peace and mercy arrived to cheer the forlorn captives and bring back to them the joyful prospect of restoration to freedom and it might be to fame. The incident, connected with the arrival of the young Herati gentleman, Saleh Mahammad, with a letter from the Khan Huzurut of Khiva is truly a romantic one and we shall permit Captain Abbott to relate it:—

It was the second or third day of our abode in this spot; the 16th or 17th of our captivity. A huge bear of a Kuzzauk chief, in a cloak of bay horse's skin, and bonnet of black sheep's skin, had just left the tent; after fruitless efforts of some hours' duration, both to make the brothers give me up, and to persuade, me to quit the brothers. I was sitting beside poor Nizaum, who still rolled in agony on the ground; affording him such miserable consolation, as an assurance of sympathy might amount to. Summud Khan and the old Meerza sat in the shadow of Cherkush Bae's tent, outside. * * * * * *

Suddenly, there appeared upon the height overhanging the tents, a young

man in Afghaun costume, handsomely dressed, and well mounted upon a dark grey horse with silver bridle. He was approaching the tents, followed by some Kuzzauk horsemen. Such an apparition, at such a moment, in such a desert, was rather startling : for the gracefulness of the Afghan attire is in strange contrast with the rude, and scarcely human costume of the Kuzzauk : and the young man who wore them, was as different in elegance of feature, and figure, from the coarse, clumsy race around us, as a blood racer from the cattle of a country farm.

"Ah," grumbled Summud Khan. "Here comes Yar Muhummud, dressed out in our finery. He's got the Meerza's turban, and one of our cloaks and the Sahib's shawl, but whose horse is he riding ?"

"Our spoils," observed Ali Muhummud, "have rigged out some thirty of these cannibals."

They altered their note, when the stranger approached them more nearly.

I was inside the tent, as I have already noticed. I heard a bustle at the door, and in rushed the old bear of a Kuzzauk, who had just quitted us. He seized me by the left hand, which was scarcely cicatrized, and almost wrung it off, with the grasp of a steam vice, wishing me joy of, I knew not what, unless it were, that *one* of my fingers survived the mangling. He then rapidly enumerated the benefits he had conferred upon me. These formed a respectable catalogue, but may, for brevity's sake, be summed up in the single item of an endeavour to deliver me over to my enemies. "From all this it appears," concluded he, "that I am your active and zealous friend, and I expect you to be mine, with the Khan Huzurut."

I bowed, and assured him, that any one who should do me service, should not be forgotten ; but observed, that I must, in the first place, be reconducted to Khiva.

"Oh !" he replied, "the Khan Huzurut has sent a messenger, and a party of horse, to deliver you."

I thought, at first, I had heard amiss, and I made him repeat his words ; Nizaum interpreting for me, between the paroxysms of his pain.

"The Khan Huzurut," I observed, "cannot yet be aware of my captivity."

"Oh ! yes, he is !"

He was interrupted by a young man in Afghaun attire, who throwing aside the curtain of the door, rushed past him, and casting himself upon my neck, exclaimed in Persian, with many tears, "Thank heaven, I have found you at last ! I have come to deliver you. I have a letter from the Khan Huzurut for you. Lift up your head, Sir. Your sufferings are at an end."

I returned his embrace, and gave him tear for tear. But my head was giddy, I could not believe my senses. I was persuaded I was in a trance.

"Whence are you," I said. "Who are you ! How came you here ?"

I pushed him back, that I might regard him more attentively. The features were familiar, but I was too confused to remember, where I had before seen them.

"Don't you know me ?" he cried, "don't you remember Saleh Muhummud, to whom you shewed kindness at Merv !"

The arrival of this sprightly Affghan gave a complete turn to the fortunes of Captain Abbott. It was like the light of the sun penetracing the Cimmerian darkness. The buoyancy of hope was beginning to fail. The captive could see little chance of immediate release from his embarrassing and wearisome situation. But Saleh Mahammad brought back hope, and shed the sun-light of cheering expectation amid the gloom, inseparable from the disaster which had arrested and still detained the Ambassador. Saleh Mahammad bore a letter from the Khan Huzurut, and also a supply of money, which, as it is a most needful article under any circumstances, was more especially so in the peculiar circumstances in which the hero of our sketch was then placed. In the altered circumstances in which Captain Abbott now found himself, his first impulse was to return straight to Khiva

and lay the state of the whole matter before the Khan Huzurut. He felt the necessity, however, of placing himself under the protection of some powerful chief; for Hussun Mhatoor, he well knew, was not far off, and he had every reason to suppose that his return to Khiva, after having been deserted by that worthy, would meet with opposition. He understood that the Yuze Bashie, as he was called, a chief whose name was Morad Ali, was somewhere in the neighbourhood; he resolved to make himself his guest; nd a movement was ordered, in the direction of the Yuze Bashie's tent. On the very morning on which the march was to commence, a messenger arrived from Hussun Mhatoor desiring the Ambassador to come to his tent; but, although Ahris Mhatoor, one of the Kuzzak brethren, previously alluded to, strongly recommended seeking the protection of Hussun, Captain Abbott continued firm in his purpose to proceed to Morad Ali's. This was attempted not without much opposition on the part of some of the Kuzzaks, who appear to have greatly dreaded the consequences of the return to Khiva, of him whom they had waylaid and almost murdered, and stripped of almost every thing. At length the cavalcade reached the tent of Morad Ali, who received Captain Abbott with kind hospitality. Difficulties were not, however, at an end; for Hussun Mhatoor's son, and that worthy himself, soon made their appearance. Morad Ali had promised to escort him to his destination, whether that should be Khiva or Dahsh Gullah. But, now that the Turkoman and a strong party had arrived, Morad seemed to hesitate. It was with great difficulty that quarrels between the parties could be prevented. Jealousy, mutual enmity on their part, set at defiance every friendly attempt to bring them to a state of reciprocal friendship. The two chiefs insulted each other. Blood was about to be shed. The son of Hussun Mhatoor, Khojeh Mahammad, was about to thrust through Morad Ali, for uttering a somewhat plain truth regarding his father's character. Saleh Mahammad interfered, and through his intervention and that of Captain Abbott the two chiefs were brought together, and persuaded to embrace. They did so accordingly, but the relentless Hussun seized the opportunity to breathe into the ear of his rival the word *kafir*, infidel. So the impression left upon the mind of Morad was that Hussun Mhatoor and he could not both live on the same earth. Morad had not then, however, the means of repressing the arrogance of his rival. He declined interfering in the affairs of our hero, and left the whole matter in the hands of Hussun; but announced his determination to hasten into the presence of the Khan Huzurut to lay before him the matter between Hussun and himself.

To Dahsh Gullah, otherwise called Nuov Alexandroffski, was the route. Plundered property had been restored, but much of it sadly cut up. Our Captain had even mounted again his own horse. All his servants were with him. They were doggedly and fanatically determined to share in his fortunes, all, however, inwardly disapproving of the march being in any direction but that to Khiva. Many suspicions were awakened; but the presence of the gay and hopeful Saleh Mahammad served to cheer and console the care-worn spirit of his fellow traveller. Upon the whole the traitor Hussun was respectful.

only he occasionally did not conceal that he felt the Ambassador and his suite were completely in his power. At the outset, he contrived to put out of the way the best horse, and in other instances manifested the most extravagant avarice. After several marches and haltings, the cavalcade arrived at fifteen miles distance from the Russian fort. Here the old Turkoman avowed his determination to go no farther, but volunteered to send his son until the party came within sight of the fort. This was at midnight. Our traveller took a friendly leave of the old traitor, and proceeded under the guidance of the two young chiefs, Khojeh Mahammad and Kooch Mahammad, until morning dawned, and the guides riding up to a cairn of stones affirmed that the Fort was in sight, and that they must return. Captain Abbott and his party could not perceive the slightest appearance of any thing, along the horizon, that could be regarded as the desired object. The guides however remained immovable in their purpose of returning, and the Kuzzak guard had already commenced a retrograde movement. There was no helping it. Captain Abbott took an affectionate leave of all, especially of Saleh Mahammad who was now to return to Khiva. The two Kuzzak brothers, Cherkush Bae and Ahris Mhatoor, continued to form part of the suite, and went all the way to the Fort : the latter reluctantly, the former burning with affectionate desire to obtain the release of his son who was detained a prisoner. The journey was pursued, and an hour after the fort was descried.

It would serve no good purpose to detail all the precautions of the Russian commandant, the tedious parleying between the party who approached from the steppe and the successive messengers who rode out to make inquiries, the prudent manœuvring of the commandant in order to give him time to put his garrison in a proper posture of defence, against the possible assault of such a formidable body as a wounded officer with his arm in a sling, and half a dozen unarmed, wounded, and timid menials. At length the servants having been ordered to remain outside, the Captain was allowed to enter alone. We may now consider our Ambassador in safety. He again participated to a certain extent in the comforts of European society ; but his troubles were not at an end. His wounded middle finger had to be amputated. It had been hanging on for a month, without any symptoms of uniting, and the two pieces of the shattered bone were just sufficiently near each other to produce a most painful sensation by rubbing together at every motion of the horse, yet in this state Captain Abbott had rode about 130 miles. The operation was unskilfully performed and excessively painful.

The two Kuzzaks had been most unjustifiably put into prison ; before leaving Nuov Alexandroffski Captain Abbott obtained their release, as well as that of Cherkush's son, and having paid over the sum of money to Cherkush, which he had promised to give him, or rather had placed in his hand, on the spot where he had been cut down, took an affectionate leave of him. No one can read that part of Captain Abbott's narrative which relates to this faithful Kuzzak, without

admiring the latter's untutored kindness, and firmness of purpose in keeping faith with the unfortunate captive thrown upon his care.

After a stay of eight days in this Fort, our friend set sail for Gorief, and after a voyage of ten days in accomplishing a distance of 180 miles, entered the river Oorahl and reached the port of Gorief. From Gorief he passed on to Oorahlsk, and thence to Orenberg, where he was kindly and hospitably received by the noble Peroffski, who was governor of the whole district, and had been commander of the expedition against Khiva. Peroffski was just setting out for Petersburgh, and mentioned to Captain Abbott that it would be necessary for him to remain in the mean time at Orenberg; but he placed his own equipages at the disposal of his guest, and to ensure his comfort and entertainment made every arrangement which polite and cordial hospitality suggested. Captain Abbott luxuriated amid the kind attentions which crowded upon him, and made an excursion into the neighbouring districts of Siberia, by which he seems to have been highly gratified. The time came for departing, however, and he made arrangements for the return of all his servants, with the exception of Summud Khan, who accompanied him not only to Petersburgh, but to England, France, Italy, Greece, Egypt and Bombay, exhibiting, in the various circumstances in which he found himself, many instances of the most persevering adhesion to his prejudices, and the most dogged maintenance of his opinions.

We shall not enter into the minutiæ of Captain Abbott's travels through Russia, and his sojourn in the capital. With regard to the negociations in which he was engaged, he has not felt himself at liberty to disclose any of the particulars, further than that he was completely successful in carrying out the ends of his mission; and that, in August, 1840, he was recalled to England with despatches. During his sojourn in Russia and its capital he was a close observer, and has presented to the public in the second volume of his Narrative, many interesting remarks on Russia and Russians. To that we must refer our readers, while we follow our author to his native land, which he was now enabled to visit after an absence of seventeen years in the service of his country. He was returning, too, in very peculiar circumstances. He had been officially employed, under the sanction of Government, in an enterprize of the utmost delicacy and difficulty, with resources inadequate to the task. He had struggled with every difficulty, and had most anxiously and scrupulously sought to forward the views of his Government. With enthusiasm he had undertaken the arduous task of traversing the steppes of Turkistan, and of making his way, from the Caspian to the Russian capital, to forward the views which he had been appointed to advocate. His journey was not only arduous in itself, but it had been fraught with danger to him. Treachery, which he had no means of counteracting, had brought him to the very gates of death, or had subjected him to the alternative of a tedious captivity, during which little could have been expected at the hands of robbers and assassins. Through the gracious guidance of an All-ruling Providence, a protector was provided for him in one, from whom he had no reason to expect such succour; and throughout the whole of the Narrative presented to us in the two volumes before us, there is no-

thing so interesting as the stedfast adherence to our traveller of Cherkush Bae. There runs throughout the character of this denizen of the Steppe a manifestation of honor and fidelity, a tone of true nobility and high-mindedness which, amid the traitorous workings of more powerful, but less honorable men, is quite delightful. The moment our traveller was released from his dreary and disconsolate sojourn among the Kuzzaks of the Caspian, he preferred again hazarding his life for the completion of his enterprize, to the option of returning to Khiva and Herat. Thus was he enabled to present to his countrymen and the Government whom he served, an exemplification of noble enterprize and disinterested patriotism, the results of which were the prevention of that carnage and desolation which might have resulted from a Russian invasion and occupation of Khiva. Was it too much, if a man in these circumstances expected that some slight notice should have been taken of him by those in power? Was it presumptuous to expect that he might be presented to his sovereign, as an officer who had perseveringly braved many dangers, and submitted to many hazards and difficulties to farther the interests of his country and consolidate her power? We know not exactly what were Captain Abbott's expectations, or if he had any, beyond the desire to see his queen. We know not but that he felt himself abundantly rewarded by the successful termination of his mission, and the good results thence arising. But we cannot help thinking that if a C. B., or a K. C. B. may be won in one engagement, certainly the lesser honour, at least, might have been bestowed on the person who established a diplomatic relationship with Central Asia, and was "the first who had ever borne to a British sovereign, a letter from a Khan of Tartary." We do hope that the services of Captain Abbott will not be forgotten. The gallant and enterprizing officer who carried out what Abbott had commenced, and accompanied to the Russian territory the slaves who had been in durance in Khaurism, deservedly received from the Government of the day a mark of their approbation, in the honour conferred upon him by his sovereign. But if this was done to Sir Richmond Shakespear, why was no notice taken of James Abbott. Few young officers have distinguished themselves more than Sir R. Shakespear. His honours are well merited; but the acknowledgement of this argues not the disparagement of Captain Abbott, nay, rather it furnishes a reason why, even at this late period, some mark of distinction ought to be vouchsafed to him; for he was the person, to whom pertains the merit of opening the way; and he alone partook of the perils and embarrassments of the initiatory exertions.

Captain Abbott staid not many months in the land of his nativity. He returned to India through France, Italy, Greece, and Egypt, carrying along with him the impracticable Summud Khan. They landed at Bombay, where the Affghan was forwarded to Kurrachee in order that he might prosecute his journey to Herat. Captain Abbott came round to Calcutta, and on September 20, 1841, was appointed Assistant to the Commissioner in Mhairwarrah. In January, 1842, he was appointed Political Agent in Nimaur, and for two years held the appointment. But in 1844, on account of the scarcity of officers, he was recalled

from political duties and ordered to do professional duty with his corps.

We earnestly hope that he may have future opportunities of distinguishing himself in the service of his country, and that in due time he may reap an adequate reward. We beg he will kindly excuse the remarks which we have thought fit to make regarding his career. The meagre sketch now presented to the public might have been fuller, more methodical, and better worth a perusal, had the writer been intimate with the subject of it, or if he had possessed more ample materials.

Before concluding we may mention that Captain Abbott is known to the world as the author of "THAKOORINE," a work containing passages of true poetry ; but neither time nor space permit us to give a critique of the poem on the present occasion. We take farewell of the author, hoping that the intervals between the demands of professional duty will permit him, as he gives us some reason to expect, to commit to the press his remarks on the places he visited on his return route to India. We recommend to the perusal of those interested in Geography, the first part of his Appendix to the Narrative, &c. It contains many interesting remarks on the statistics and geographical features of Khaurism.

SAINT PAUL'S CATHEDRAL.

CALCUTTA.

IN a former number of the 'Review' we presented our readers with a sketch and notice of St. John's Cathedral,—a plain, homely, unpretending building, in which the service of God has, no doubt, been as faithfully, ably, and zealously performed as in the most magnificent of European edifices, but to which, nevertheless, we have ever thought the title of Cathedral most singularly inappropriately attached, if not, indeed, intended as a mockery upon its meanness.

We have now the gratification to offer a representation of the very beautiful edifice which has so lately, and as if by magic, reared its delicate and lofty spire upon the plain of Chowringhee, which is not only, in our humble opinion, worthy the name of Cathedral, and the taste of its architect, but of the fast swelling metropolis of British India.

We are not of those who deem the Lord unfitly served under a humble steeple, or not acceptably worshipped in a house with no steeple at all, but we *do* think that the heathen by whom we are surrounded, and whose conversion to our faith forms the grand object of Missionary labour, can hardly think us in earnest when, to their eyes, we appear to estimate God less than mammon, and erect far nobler buildings to the honor of—however good—men, than to Him whom we declare the only true and living God, to whose especial favor and protection we attribute our mighty possessions in so many lands, and whose glory it is the professed object of our ministers to advance.

For ourselves, with not a tittle of Romanism (or Puseyism, either) in our hearts, ever bearing in mind that it is God who honours the house,

not the house that honours God, and with a full appreciation of the dangers which are attached to show and external form in their effects upon the minds of the ignorant, and whilst, moreover, we would have that portion of the *interior* of a church devoted to Divine worship sufficiently *plain* to avoid distracting the attention of the congregation from the grand object of their assembling, we would desire to see the *exterior* not rivalling but *excelling* the ecclesiastical magnificence of Rome, Florence, or Milan.—Our churches serve for holy banners: should we not exalt them in the eyes of the nations?—Should the crescent of Mecca, or the trident of Benares, in effect, look down upon the cross of Calvary?—We say no, if the motive be good, not springing from the mean spirit of rivalry and national show, but the love of rendering "honor to whom honor is due,"—saying in sincerity of heart—*Deo soli gloriæ!*—It is the motive which God regards: the act is a test of its sincerity, neither displeasing to Him nor useless to mankind. It appears to us a misfortune of the age that whilst rejecting the errors, evils, and follies of Romanism, we are also, in our zeal, rejecting much that is beautiful whilst innocent, tasteful while harmless. We are scorning the beautiful binding with the book, instead of contenting ourselves with substituting a purer text.—Why so?—Is not the better book worthy the better binding?—But we need not amplify. Look to some of our modern church steeples. How are they surmounted?—With emblems of the suffering Saviour, of his meekness, of his love, his majesty, or his glory?—No. We might refer to some of our principal Protestant churches, upon the spires of which enquiring strangers, or wondering heathen, are left to discover Christian characteristics in *crowing cocks* and *flying dragons!*—But we think we see an end to this bad taste, these "most lame and impotent conclusions," in a return to a style of architecture, beautiful in its kind, appropriate and distinct in its character, and endeared to our recollections by its association with all that is "time honoured," venerable, and holy, in our native land,—the *gothic.*

Such is the style of architecture, modified by present circumstances, and termed by Mr. Britton *Christian,* and further modified to suit the climate of India, and hence proposed to be termed *Indo-christian,* which has been selected for the structure to which we are now directing the attention of our readers.

The origin of the new Cathedral may be briefly stated. For many years the want of a commodious place of worship would appear to have been felt in the spreading neighbourhood of Chowringhee, the distance of which from the existing churches, and the actual paucity of *unlet* seats in them, however often, from sickness or other causes, they might be empty, offered obstacles to the attendance of many persons at Divine worship on the Sabbath. Upon the arrival of Sir Francis Chantrey's beautiful monument to Bishop Heber, for which no appropriate spot could actually be found in any of the present churches, and in a conversation between the Bishop, the Honorable Mr. Bird, and Colonel Duncan Macleod, the oft-defeated project of a Chowringhee church, which every day's observation seemed to render more expedient, was revived, and it was then, at the suggestion of the two gentlemen last named, that the design of the present Cathedral was conceived.

It is said of Howard the philanthropist, that "the moment of finishing his plans in deliberation and commencing them in action was the same," and to do Bishop Wilson justice we must say he appears to have been actuated by a similar spirit, for no time was lost. Application was made to Government for a site of land, and, a spot having been fixed upon sufficiently without the prescribed range of the Fort, was immediately granted. The grant was accompanied by an explanation that the Governor General (Lord Auckland) influenced by considerations of the highest importance --by the sacredness of the object, and the recommendation of the President in Council, had been induced to depart from the strict rule by which he had hitherto been guided in rejecting all applications for permission to build on parts of the Esplanade contiguous to the most populous parts of the town, and with the condition that the proposed edifice should not be surrounded by a dead wall, but enclosed with iron railings. Major W. N. Forbes was then requested to furnish plans and designs of the edifice, for the erection of which funds only were now wanting.

The Bishop—to whose zeal and untiring energy the bold project has owed its success—convinced that " no good design has ever yet failed in India from mere want of funds," determined to set an example which should place failure almost at defiance—by devoting more than the revenue of his see for four years—a lac of roopees in all—to the object, and a similar sum, if it became necessary, when that was gone, either during his life or after his death. This was followed by his Lordship's private circular to the gentry of India, and his letter to the President in Council, soliciting from the Hon'ble Court of Directors a subscription, similar to his own, conditionally that the other subscriptions should fail of realizing the whole sum supposed likely to be wanted for the completion of the entire design, which was six lacs.

A committee, of which the Bishop was president, and consisting of the venerable Archdeacon Dealtry, Colonel Macleod, Major Forbes, Major Fitzgerald. C. K. Robison, Esq. R. Molloy, Esq acting Registrar, and the Rev. J. H. Pratt, was then formed for carrying on the undertaking.

The first stone was laid on the evening of the 8th of October 1839. In December the works commenced, and proceeded till May of the following year, when, as we are told in the Bishop's Report, "a pause became unavoidable, from the Hon'ble Court of Directors having attached to a promise of a grant of a lac and a half of rupees the condition that the edifice should be enlarged to its first [proposed] dimensions, for the accommodation of 800 or 1000 persons." This condition was, of course, most cheerfully complied with,—the ground plan altered in accordance with the original design, from which circumstances—the doubt of means—had induced a deviation, and the erection once more proceeded with as much rapidity as the extraordinary difficulties, both in relation to climate and soil which were met with, would permit.

Our space does not permit of entering into the detail of argument in respect to the necessity or suitableness of *Cathedral Establishments*, nor, probably, would our ecclesiastical learning lend much weight to an

opinion on the question either upon one side or the other. We leave the Bishop, who is so well able, to satisfy all who may entertain doubts upon the point,* repeating only his assurance that he will most earnestly "labour to prevent the rise of the apprehended evils, and so to frame the Cathedral regulations, as to secure evangelical piety and simplicity in the members of it for future generations."

In illustration, however, of the Bishop's views in reference to the grand *objects*, future prospects and operations of the Cathedral itself, as well the encouragement which has been met with, we do not know that we could do better than quote from the Report and the two documents to which we have already referred, his Lordship's own writing.

First—in reference to "*The Importance of the spiritual objects in view in the present circumstances of India.*" After discussing the question of the necessity for a CHURCH, and rightly observing—"we build not for the present generation only, but for succeeding ones"—he proceeds to say—

"ii. But it is as a CATHEDRAL that the sacred edifice is to be chiefly regarded, in which view the Hon'ble Court observe, that they offer no objection to such an arrangement, though they do not contemplate providing for its establishment, and distinctly stand aloof, as a Government, from its benevolent and Missionary purposes."

We omit the explanation here given of the nature of Cathedrals and cathedral establishments, and of the benefits which have resulted during the three centuries of the reformed religion from our English metropolitan Churches, and resume the question in reference to the necessities for India:

"From the blessed period of the Reformation, therefore, a Cathedral Church and Clergy have been attached to every English Bishopric: and if India forms the first example of the erection *de novo* of a Protestant Mother church with endowments, it may well do so, from the unparalleled importance of the Diocese, and the magnificent and almost boundless extent of the British Empire, filled with millions of Heathens and Mohammedans, who overtop and obscure the feeble budding of the Christian cause.

"If any diocese in the world demands a metropolitical church and an incorporated Clergy, it is India, from the novelty of the Episcopate, the small number of Rev. Presbyters, the distance of their residences, and their perpetual removals on account of health. If England, the strength of the Protestant religion in Europe for ages, acknowledges the value of Cathedrals, much more will India, struggling into existence as a Christian establishment.

"The visionary dreams also of a mystic theology, or rather pantheism, which prevail in India, peculiarly demand a body of learned Divines soundly educated, and with more than usual leisure, for the solid confutation of speculative error. The Oriental vedantist is no common opponent.

"The efforts, on the other hand, of Popery to regain her ascendancy in the Eastern as well as the Western world, together with the rise occasionally of enthusiastic sects, who throw off all ecclesiastical discipline, form a powerful argument for strengthening the bulwarks of our reformed Church by a Cathedral Clergy.

"The new classes of intelligent natives trained in the Hindoo and Medical Colleges, and the various other Colleges and schools multiplying all around by the aid of Government, with their intense curiosity after English literature, furnish

* See Report, p. 29 to 33.

another reason why a small, but learned and well read body of Clergy should surround and support the Bishop in the furtherance of the Gospel.

"The founding of a Native Ministry, also, will have the tendency to render Christianity in some measure less dependent than it now is, on the anomalous and inadequate provision of ministers of religion by chaplains appointed from home, and Missionaries nominated by its Religious Societies.

"Moreover, as every Diocese of every country and in every age of the Church has its peculiar cast of mind and national character, with its correspondent errors and dangers to be checked by its own body of Divines; so must India have her own theologians, her own writers on evidence, her own ecclesiastical historians, her own refuters of heresy, her own commentators on Scripture, her own school of Divinity. Europe cannot meet the Oriental mind except as a temporary expedient."

Secondly—In reference to "*the course things may probably take immediately after the consecration:*

"A body of Cathedral clergy, further, will be ready, almost immediately upon the consecration, to enter on the duties of a Metropolitical Church. They will be seven in number; the Bishop, the Archdeacon, the two new Cathedral Chaplains, the two canons provided by the Propagation Society and by the lac and a quarter of Endowment fund already promised, and the Bishop's chaplain.

To these the usual lay officers will be added, the Registrar, the Verger (removed from the present Cathedral,) the Clerk, Organist, Singing master and Quoristers—the whole forming an adequate establishment for a commencement of sacred duties.

"Daily prayers, then, may at once be celebrated as in the Cathedrals at home, as is expressly ordered indeed by our Rubrics; and weekly sacraments on the Lord's day and on festivals. Gradually, lectures may be delivered on the evidences of Christianity, courses read in Theology or some branches of it; students prepared, after their college course is finished, for Holy Orders; conferences held with learned Natives, catechetical classes formed; and examinations of schools carried on. And so soon as things are settled, and the endowments enable the Bishop to do so, a benevolent Christian Mission may be begun in the vicinity, according to the design intimated in the Prospectus of June 1839.

"The Bishop ventures, then, upon the whole, to express a hope that the designs thus sketched out, may be considered as having a most important bearing on the establishment of Christianity in its safest and soundest form in the East; and may, if God vouchsafes His grace and blessing, in connection with Bishop's College, the Head Seminary of the Church Missionary Society, the Calcutta High School, the Mission Schools of our two great Missionary Institutions, and our new Diocesan Society for maintaining additional Clergy, go far to fix Christianity in the soil, and give it stability and permanency in India.

"This Cathedral foundation will be a proper accompaniment of our increasing empire in the Eastern world. It will form a suitable and prominent part of the public establishments of the greatest of the Protestant Nations. It will testify our gratitude to Almighty God for granting us the most stupendous dependent Dominion ever conceded to any Christian people. It will show that, instead of being ashamed of the Gospel, we rejoice to hold up the torch of truth before the eyes of the wandering populations, to point out to them the path to life and salvation."

Thirdly—with reference to the encouragement, the means of completing the great scheme. We have already stated that the supposed probable amount requisite would be six lacs of roopees, but subsequent estimates went to show that, with the increase of the plan, and other necessities essential to the appropriate fitting up of a Cathedral, and at first unprovided for, such as clock, organ, bells and darkened windows, the expences would be raised to about four lacs for the building alone, whilst six more would be required for its efficient endowment—making in all TEN LACS. To meet this demand we find the Bishop's

donation, immediately and prospectively, of two lacs,—the Hon'ble Company's grant of a lac and a half,—a donation of 50,000 Roopees from the Society for Promoting Christian Knowledge, and the subscription of the British residents of Calcutta of about 60,000 Rs. To this we have to add the subscriptions raised under the liberal auspices of the Archbishop of Canterbury, the Bishop of London, and the University of Oxford. To the grant of the Court of Directors was attached three conditions;—first, the increase of the building (already mentioned); second, their non-connection, as a Government, with its missionary objects; and third, that a fund should be reserved from the subscriptions for the support of the Cathedral establishment. To this gift of money the Court added an unexpected and important boon—the appointment and support of two additional Chaplains;—"a gift, (says the Bishop) worth indeed to us not less than two lacs and a half, as the interest of such a sum would about equal the annual salary of two assistant Chaplains." This acceptable boon had been preceded by an encouraging step, of similar character, on the part of the Society for Propagating the Gospel in Foreign Parts, who determined to found a "canonry, to be held by a Native priest who, besides taking a part in the service of the Cathedral, should be employed as a Missionary to the Heathen who live around."

We must not omit to name, also, the very handsome gift of a painted window, presented, under sanction of the Queen, by the Dean and Canons of Windsor. Whe subject of the painting is *The Crucifixion*, from a design by West, but the form of the window, unfortunately differing from that for which the design was originally intended, a portion only will be available. The work we believe is valued at about £4,000.

With all these noble gifts and encouragements, however, the amount needed is far from attained. "The greatest efforts (says the Bishop) will be necessary, therefore, on the part of all our friends in India and at home, to carry through this important design with the spirit with which it has been begun."

Lastly—not that we esteem it lightly—for, indeed, according to modern phraseology, things of "the *last consequence*" are of the very "*first moment*"—we may venture a few words upon the building, although far from complete.

We are not architects, and will not therefore venture out of our depth by dealing with other than a few general particulars. This however, we will say, and have little fear of being gainsayed, that if to the piety, the zeal and the energy of Bishop Wilson we owe a CATHEDRAL to the See, it is to the architectural taste and judgment of Colonel Forbes that the community are indebted for *an ornament to the City*. Our little lithograph furnishes as fair an idea of the edifice as could well be expected on so small a scale, and at the hands of a native copyist.

In reference to the interior arrangement the Bishop observes,—

"Coolness will particularly be consulted. The freest possible circulation of air, and the full effect of the punkas, (for these as well as venetians to the windows are indispensable in Bengal,) will be provided for by the extraordi-

nary height of the roof, by the thickness of the walls and buttresses, by the absence of galleries and clustered columns, by the darkening of the windows with deeply painted glass, by shielding the grand western entrance with a wall and veranda, by the raising of the floor four and a half feet above the ground, and by creating currents of air between the lower divisions of the windows of the sacred edifice and the lantern. On the whole the Bishop hopes it will be the coolest Church in India, if such language can be applied to any edifice in such a climate."

We may state generally that the architectural detail proposed to be given to the edifice are principally taken from those met with in York Cathedral, but that as yet only a few of them are in their places, the greater number being of cast iron, so fitted up as to admit of being subsequently attached to the walls by rods passing through them. The lower row of windows in the choir, and throughout the building, are, we believe, irregular as respects the order, but without them the Church would not have been properly ventilated, and the congregation would in their absence have been in a sort of hot well! The roof, the trusses of which are of wrought iron, we may state, was a matter of necessity—not of choice, so as to afford the accommodation stipulated for by the Court of Directors. It then became indispensable to *leave out in the choir* the confined parallel row of fluted columns, forming, as originally intended, side aisles, and which would have interrupted the view of the preacher. The roof, however, may be furnished with gothic ornaments to any extent for which funds may be *ultimately forthcoming*, and the same observation applies to the scale of ornament throughout the interior, which will be as rich *as can be afforded.* The friends of the undertaking therefore who desire to see the thing not *half done* have yet need to be unrelaxing in their exertions. Were it alone for the sake of "our honoured architect," we trust it need not be made a question whether all that is needed to do justice to his design shall be forthcoming. When a man devotes his genius, his time, and his energies, to a great work, the least he may expect is a sufficiency of the base material for its execution.

When it is remembered that all the great European Cathedrals have cost from one to £ 3,000,000, and when, moreover, the extraordinary difficulties which have had to be encountered in reference to climate are taken into consideration, we think it will be conceded that with £ 40,000, which is to be the total cost of the Calcutta Cathedral, Colonel Forbes has accomplished wonders, and that despite the unaccommodating nature of an Indian sun, a tropical storm, and a short purse, the combination of gothic dignity, with elegance, lightness, and Indian convenience and comfort, could hardly have been more successful, or more happily realized.

The horizontal dimensions of the building will be found in the ground plan which we annex—we need only therefore add that the extreme height of the spire from the ground is 205 feet.

The following is a copy of the inscription enclosed in the Foundation Stone :—

"IN THE NAME OF THE BLESSED AND UNDIVIDED TRINITY
THE FIRST STONE OF A CHURCH
TO BE CALLED AND KNOWN BY THE NAME
OF
Saint Paul's Cathedral, Calcutta,
AND
DESIGNED FOR THE WORSHIP OF ALMIGHTY GOD ACCORDING TO
THE DOCTRINE AND DISCIPLINE
OF THE
APOSTOLICAL REFORMED CHURCH OF ENGLAND AND IRELAND
WAS LAID BY
DANIEL, BISHOP OF CALCUTTA, AND METROPOLITAN OF INDIA.
ASSISTED BY THE ARCHDEACON AND CLERGY
AND
IN THE PRESENCE OF MANY OF THE DISTINGUISHED GENTRY
OF CALCUTTA,
ON TUESDAY THE 8TH DAY OF OCTOBER IN THE
YEAR OF OUR LORD 1839;
AND
IN THE THIRD YEAR OF THE REIGN OF HER MOST EXCELLENT
MAJESTY
Victoria,
QUEEN OF GREAT BRITAIN AND IRELAND.
THE SITE
WAS GRANTED BY THE
RIGHT HONORABLE GEORGE LORD AUCKLAND, G. C. B.
GOVERNOR GENERAL OF INDIA,
AND
THE HONORABLE COLONEL W. MORISON, C. B.
THE HONORABLE J. C. ROBERTSON AND THE HONORABLE
W. W. BIRD,
MEMBERS OF THE SUPREME COUNCIL,
IN THE NAME OF
THE HONORABLE THE EAST INDIA COMPANY.
THE DESIGN AND PLANS
WERE DRAWN BY
W. N. FORBES, MAJOR OF ENGINEERS
AND
MASTER OF THE HONORABLE COMPANY'S MINT
AND
THE BUILDING IS TO BE ERECTED
(IF GOD IS PLEASED TO PERMIT)
UNDER THE SUPERINTENDANCE OF
COLONEL D. MACLEOD, CHIEF ENGINEER,
THE ABOVE NAMED MAJOR FORBES
AND
W. R. FITZGERALD,
MAJOR OF ENGINEERS, AND CIVIL ARCHITECT.

'*Except the Lord build the house; their labour is but lost that build it.*' Psalm cxxvii.

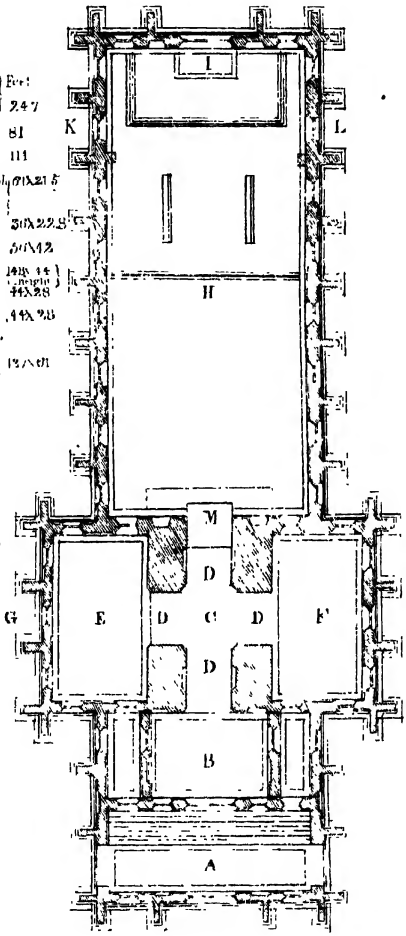
'*His name—Messiah's—shall endure for ever; His name shall be continued as long as the sun; and men shall be blessed in Him; all nations shall call him blessed.*'

'*Blessed be the Lord God, the God of Israel who only doeth wondrous things. And blessed be His glorious name for ever; and let the whole earth be filled with His Glory; amen and amen.*'—Psalm lxxii. 17—19."

East

Reference

Extreme Length of Cath^l including Buttresses.	Feet 247
Extreme Breadth	81
and at Transepts	111
A. Western Carriage Verandah and Entrance	61X21.5
B. Western Vestibule .	36X22.8
C. Tower and Lantern	50X42
D. Four Arches of Tower	14 8 44 height
E. North Transept .	44X28
F. South Transept .	44X28
G. Great Northern Entrance	
H Body of the Cathedral for Divine Service	127X61
I. The Holy Table	
K North Eastern Entrance	
L South Eastern Entrance	
M Organ	



West

Scale of Feet. 0 6 12 18 24 24 48 72 96

THE CALCUTTA FREE CHURCH OF SCOTLAND.

No event of the period more strongly excited the interest and attention of the thinking world, or aroused the deep sympathies of Christian men more keenly than did that of the recent secession of the Church of Scotland; and we know of none so certain to arrest the solemn consideration of future ages of the church, or to create in the minds and hearts of her children sentiments of reverence and admiration more pure and devoted than must be felt and cherished for those whose memories will be associated with the event itself, and who, throughout the painful and protracted struggle by which it was preceded, amidst the distracting allurements of worldly position and worldling feeling, with undeviating and unshaken fidelity upheld against all encroachment or diminution the sacred authority, honour and alone supremacy of their Lord,—of HIM who reigns for ever and for ever.

With these feelings, and with these views of the subject our readers will not be surprised that we have been induced to select as one of the illustrations, of this our last issue, an elevation of the beautiful structure now progressing for the use of the members of the Free Church in Calcutta, or that we make it the occasion of annexing a few brief particulars connected with the history of the subject, its rise, progress and result.

The great fundamental principle in the Christian Church drawn from the word of God, that, "Christ is the head over all things in the Church," is one by which the Church of Scotland, from time immemorial, has been almost singularly distinguished. Whilst with willing and implicit obedience she has always submitted to the secular power in all matters of a civil character, whether as to temporalities conferred by the state, or the consequences of her own court decisions in various matters so far as they were affected by the law, and so taught and enjoined her children,—she has never relinquished or waived her exclusive jurisdiction in matters of a spiritual and ecclesiastical nature founded on, and exercised in accordance with, the laws of her Divine Head.

These rights and privileges, so exercised throughout a long course of time, both in her capacity as the Church of Christ, and as the established national Church of Scotland, were fully and completely recognised by the statutes of the land; not only was she thus secured from all interference on the part of the secular power, except in so far as we have stated, but on the other hand a strict injunction rested on all civil courts and on all officers of justice, enjoining them to render to the church whatever needful aid, within their several jurisdictions, she might require for the due and faithful execution of her several sentences spiritual and ecclesiastical.

No rights or privileges could be more firmly secured than were those of the Presbyterian Church of Scotland. Her "confession of faith" was ratified and established, voted and approved by the Government, and fully and entirely annexed to and incorporated with the statute

law of the kingdom. The king on his accession solemnly vowed the sacred and due observance of her rights and the supremacy of her courts in matters spiritual and ecclesiastical; an "act of security" was passed for her especial protection and reiteratedly, by act upon act, approved and confirmed.

In the first parliament of James Sixth, afterwards James First of England, an act was passed entituled "*anent the jurisdiction of the true kirk*," which act was renewed in the sixth parliament of the said King James; and these again approven and ratified by an act of the same king passed in the year 1581, entituled, "Ratification of the liberty of the true kirk of God and religion," with confirmation of the laws and acts made to that effect before. In the twelfth parliament of the same King James Sixth, another act, similarly entituled, was passed wherein the whole of the acts already named were recited, again revived, ratified and confirmed. It is to be observed that occasionally attempts were made by the secular power to coerce the church in matters purely ecclesiastical, and hence the various enactments for confirming and establishing the rights and privileges of the church, the invariable result of all such endeavours on the part of the civil power. One of these occasions may be particularly noted: one Robert Montgomery, minister of Sterling, in 1582, under a presentation from the king, endeavoured to force himself into the Archbishopric of Glasgow, in opposition to an express act of the General Assembly discharging the office of prelatic Bishop. Failing in his object and incurring the censures of the church, he sought by the aid of the secular power to have these censures suspended and interdicted, and was therefore deposed and excommunicated, notwithstanding an interdict from the privy council of Scotland—the then supreme secular court of the kingdom. The sentence of excommunication was declared by one of the acts of parliament of the year 1584 (known as the *black acts*) void; yet so clearly defined were the rights of the church in this matter, and her proceedings so strictly in conformity with her prescribed power and established discipline, that ultimately the king and privy council abandoned their interference, and Montgomery submitted to the church authority which he had so endeavoured to set aside. The act already mentioned of the twelfth parliament of James had special reference to the act of 1584, which it annulled; declaring as "null and abrogate, all and whatever acts, laws and statutes made at any time before the day and date thereof against the liberty of the true kirk jurisdiction and discipline thereof as the same is used and exercised within this realm."

The act just recited was repealed in 1662; but, on the accession of William and Mary to the English throne, was revived, renewed and confirmed by the 5th Act of their first parliament. The affairs of the Church do not appear to have required further interference, or to have met with serious interruption or damage till the eventful year 1838, when the civil courts of Scotland began to assert a right on the part of the state to interfere with and absolutely control the Ecclesiastical courts of the kingdom, which as we have seen had been so frequently authorised by the acts both of the Scottish and English parliaments, and by the

treaty of union. After having assumed exclusive jurisdiction in all matters spiritual,and after a series of encroachments, more and more violent, they proceeded at length to interdict the very preaching of the word, —to deprive the people of all voice whatever in the election of their pastors and actually to coerce the ministers in the matter of admission of individuals to the sacrament of the Lord's supper. This monstrous course of usurpation and encroachment upon all that was hitherto deemed the unquestionable constitutional rights and most sacred religious liberties of a christian people, formed the theme of repeated but fruitless appeal and remonstrance both to ministers and parliament. Redress from man became at length utterly hopeless, and on the 18th of May 1843, a day to be remembered, a minority little short of a moiety of the ordained ministers of the Established Church of Scotland, we believe 477 out of about 1040, and a vast *majority* of the people, separated, under a solemn and formal protest, from a body so utterly enslaved as the Establishment now appeared to be.

On this momentous occasion every minister and missionary of the Church abroad as well as at home, had of course and necessarily to determine, *to which* section of the disrupted Church of his fathers he should now adhere. The fact is a memorable one, and significant beyond all expression—it *told* at home with unspeakable force on the bluntest understandings, that every missionary of the Church, without one single exception, in all parts of the earth, united himself instantly and cordially to the FREE CHURCH as THE true and national church of the Protestant reformation in Scotland.

The missionaries of the Church in Calcutta, five in number, with a number of lay members of her communion gave in their adhesion to this, as the *true* Church of Scotland, and joined in forming a congregation to which the first sermon of the Free Church was preached in the Free Mason's Hall, Cossitollah, by the Rev. Dr. Duff, on Sabbath, August 13th, 1843.

The congregation has continued since then to meet regularly for public worship in the Hall of the Parental Academy, Free-school Street; under the pro-tempore ministry of the Rev. J. Macdonald of the Free Church Mission, with the occasional assistance of his colleagues.

A subscription was speedily set on foot for the erection of a Church; plans were invited from all the professional architects of Calcutta, and one which was tendered by Captain Henry Goodwyn, of the Bengal Engineers, was at length cordially and unanimously adopted at a public meeting of the friends and adherents of the Free Church in Calcutta, held on the 2nd of May 1844.

The estimated cost of the Building, exclusive of the purchase of ground and fittings up, was about 30,000 Rs. An open and centrical piece of ground in Wellesley street, immediately to the north of the Madrissa or Mahommedan College, was obtained for about 10,000 Rs. from the trustees of a unitarian association in Calcutta, long since extinct, which had purposed erecting a Chapel thereon.

The foundation stone of the Free Church was laid with due solemnity on the 13th day of August 1844, by John Allan, Esq. and the following inscription on a Roll of vellum was deposited therein :—

THE FIRST STONE OF

THE FREE CHURCH OF SCOTLAND

WAS LAID THIS DAY, TUESDAY, 13TH DAY OF AUGUST IN THE YEAR OF OUR LORD 1844;

AND THE EIGHTH YEAR OF THE REIGN OF HER MAJESTY

Queen Victoria;—

THE REVD. DR. ALEXANDER DUFF, SENIOR MINISTER;

THE RIGHT HON'BLE SIR HENRY HARDINGE, G. C. B. GOVERNOR GENERAL OF INDIA;

THE HON'BLE WILLIAM WILBERFORCE BIRD, ESQUIRE, DEPUTY GOVERNOR OF BENGAL;

J. H. PATTON, ESQR. CHIEF MAGISTRATE OF CALCUTTA;

THE REVD. HENRY GREY, A. M. MODERATOR OF THE GENERAL ASSEMBLY OF THE

FREE CHURCH OF SCOTLAND.

MINISTERS AND ELDERS OF THE FREE CHURCH IN

CALCUTTA.

THE REVD, J. MACDONALD, OFFICIATING MINISTER.

THE REVD. DR. DUFF.	MESSRS. M. MACLEOD,
„ W. S. MACKAY.	„ SIMON NICOLSON,
„ D. EWART.	„ R. J. ROSE,
„ T. SMITH.	„ J. C. STEWART &
MR. J. A. F. HAWKINS	„ M. WYLIE, ELDERS.

BUILDING COMMITTEE

REVD. DR. A. DUFF, REVD. W. S. MACKAY, REVD. D. EWART, REVD. J. MACDONALD, REVD. T. SMITH, DR. SIMON NICOLSON, D. MCCALLUM, JOHN ALLAN, W. NICHOL, J. C. STEWART, R. J. ROSE, M. MACLEOD AND N. MACNICOLL, ESQUIRES.

CAPTAIN HENRY GOODWYN, BENGAL ENGINEERS, ARCHITECT.

This Church was begun under the good PROVIDENCE of GOD, aided by voluntary subscriptions amounting to this date, to Rs. 35,696 11 2.

August 1844.

The building, under the able superintendence of its talented architect, was soon in a forward state. The body was roofed in and the tower and spire were so nearly completed towards the close of last year that the strongest hopes were entertained that a few months would see the opening of the Church for public worship:—those hopes were however most painfully broken by a disastrous and unforeseen event.

On the 15th of January in the present year (1846) one of the internal columns supporting the roof, from some cause not clearly ascertainable, unfortunately gave way, and those nearest to it, yielding to the increased superincumbent pressure, brought down, with a frightful crash, the whole of the roof on the east side of the Church.

This occurrence most providentially took place at a late hour of the night; had it happened at any working period of the day the result might have been disastrous and appalling in the extreme; it is cause of great thankfulness that no injury was sustained in life or limb.

This sad catastrophe naturally excited the anxious attention and consideration of those most interested in the welfare of the church, and it was judged necessary so far to alter the original design as, by increased strength, to remove all probable apprehension as to the future stability and safety of the building.

The contemplated alterations and improvements on the plan originally proposed and acted upon will involve the necessity of great additional expence and loss of time, but these evils are more than counter-balanced by the advantages to be gained; and the Committee have most unquestionably judged and acted wisely and well in adopting the most effectual means of allaying every uneasy feeling likely to be kept alive by the remembrance of so untoward an accident. On this point therefore it affords us pleasure to state, which we do on the best authority, that the arrangements of the Committee for so desirable an end are such as cannot fail to give the utmost confidence to the congregation and the public;—being the result of consultations between other high professional authority and the able architect by whom the work was undertaken.

The Free Church place of worship in Calcutta, as a property, and the land it stands on, are vested in the names of four Trustees in a deed drawn up conformably to the well considered document in use by the church at home.

As an integral part of the Scottish national Church the Calcutta Free Church is subject to precisely the same Government on the purest model of Presbyterianism. The Church Session consists of the moderator, (the Pastor) the other ordained missionary ministers as elders, with six ruling elders elected by the votes of the communicants of the flock. The ordained ministers and missionaries of the Free Church of Scotland, with an equal number of the ruling Elders of the congregation, form therefore, by act of Assembly, the *Presbytery* of the Calcutta Free Church—exercising all the functions of that spiritual court as do Presbyteries at home. The meetings of the Calcutta Presbytery are quarterly, and the Court is open.

Through the Colonial and Foreign Mission committees of the General

Assembly of the Free Church in Edinburgh, the Calcutta Free Church and congregation have, we hear, been so happy as to secure for their stated pastor the Rev. Mr. Mackail, late Free Church missionary at Malta, and of whose qualifications and general acceptability they are justified in forming the highest hopes. A fund for the support of a regular ministry was some time since established and is in a flourishing condition.

The style of the building, we believe, when finished will be as strictly Gothic as the nature and necessities of an Indian climate will allow. There is one feature in the merely decorative part of the building which deserves remark: we allude to the crowning ornament on the spire—a burning bush—the chosen emblem of the reformed Church in Scotland from her foundation with the immortal motto, *nec tamen consumebatur*.

Nothing could have been selected more appropriate to the *character*, *pedigree*, or present *condition* of the Free Church. To those, therefore, who apprehend its significancy it must appear singularly apposite, and we can only regret that the skill with which the artist has executed so novel and so difficult a device, from the elevated point which it occupies, is not so generally admired, because neither so generally understood, nor so clearly definable as the more usual ornaments of doves, cocks or arrows.

The building was planned to accommodate from 320 to 350 persons, though it is now probable that the contemplated alterations, already mentioned, may so far increase the space as to admit a much greater number than it was originally designed to hold.

VALE ET VALETE.

It is observed by Dr. Johnson that "there are few things, not purely evil, of which without regret we can say—'this is the last.'" Unquestionably, the great moralist drew this observation from fact: for there is probably no position in life of the tenure of which, no occupation in the closing of which, we can say, without some sensation of sorrow, even though the occasion of departure should be joyful, 'this is the last.' He who retires from the bustle of existence under the consciousness of having secured comfort and independence by the sweat of his brow, has still one sigh to bestow upon "Othello's occupation gone." Editors of journals and periodicals, like other working animals, rejoice in their season of rest when it arrives as the natural consequence of a protracted labor; but when they permanently withdraw into the privacy of an unambitious career, they experience their due proportion of pain in the abandonment of an accustomed office. If this applies to such as quit, or retire from, their business under the most favorable circumstances, with how much greater force must it not apply to him who, having none of the advantages that then overbalance regret, feels he is retreating under the conviction of his retreat being

compulsory? Unhappily, he who now presents his last number of the *India Review* to those who have continued to patronise the work, confesses himself to stand in the latter category and bound to acknowledge his inability to progress, owing to that worst of all wants—pecuniary aid, in those who were, de facto, but *nominal subscribers* to the *Review.*

In taking a very brief survey of the course which the '*Review*' has ran, it will only be necessary to mention that it was projected by that indefatigable, talented and exemplary man, Dr. Frederick Corbyn, with the laudable desire of awakening among all classes of the community of India, who could, by possibility, be interested in them, a taste for Art and Science, and of fostering a disposition to further the ends of both by laying before his readers the latest intelligence supplied by the march of investigation or improvement in Europe, or the researches that have marked the progress of gifted individuals employed in the exploration of the resources of this vast empire. In the year 1836, Dr. Corbyn separated the *Review* from the *India Medical Journal,* with which it originally formed a single compilation, and his industry achieved a signal triumph in the high circulation to which the *Review* attained, and the mass of information with which it teemed on every subject of useful discovery. In 1843, under circumstances that led him to relinquish this portion of his pursuits, the work passed into the hand of its present Editor, who managed to drag through nine numbers with an increasing confirmation at every issue, that the task would be beyond his means unless subscriptions were punctually paid into the treasure chest. Unfortunately the constantly shifting situation of those who come to India for the establishment of their prospects and future independence, is greatly opposed to the regular support that a periodical, unsupported by capital at command of the Editor and Proprietor, requires. Duties of infinite variety, in kind, call away many who have taken an active interest in promoting the success of a work both by pen and purse. Some contributors flag from very indolence; others are discouraged by the difficulties that present themselves as to regular and punctual publication; some remove altogether from the country; and some, (we have experienced this wofully,) are blessed with short memories and forget to offer payment in exchange for amusement or intelligence when the period of settlement arrives. It will at once be evident that no periodical depending on pecuniary punctuality for its success, can live unless "the sinews of war" be duly supplied to it:—and that in the present instance they have not been: that the Editor has truly declared his undertaking to be a dead loss—such as none but a madman would *continue* to incur—he has sufficiently proved by the exhibit he adduced at the close of the last number that he issued. Without arrogating pretensions that it would be folly in him to assume, he may be permitted to say, and at any rate he trusts to the indulgence of his friends when he *does* say, that, at the moment of taking his task in hand he fondly hoped the utility of the work itself, if fairly carried on, was placed beyond dispute by the well-earned reputation it had acquired under his predecessor. He trusted that the friends of the work were the friends of it *for its own sake,* and that the mere change of a super-

intending hand could not materially affect its circulation:—that he has been grievously disappointed needs no other testimony than the simple fact of his being compelled to make this number—THE LAST. But while thus relating what has been the necessity, there is yet one grateful labor remaining which he hastens to execute with the highest alacrity, as, in the present juncture, neither the sincerity, nor the disinterestedness of it can be called in question. Flattery has very little to do with falling concerns, and therefore the expression of gratitude under the circumstance for favors received, carries with it the impress of its own integrity. Gratifying indeed is it to the remembrance, how cheerfully many able gentlemen have contributed to adorn the pages of the *Review*, and the Editor feels sensibly that he has every thing to acknowledge to them on this score. The warmth with which their communications were made stands out in strong contrast with the cold impediment of pecuniary neglect—the real cause of the *Review's* decay. The papers purely critical have been furnished by men whose talents are admitted wherever the individuals are known. Those of a more scientific character have been received from persons of well understood scientific attainments; so that in fact, beyond mere compilation, and arrangement, the toil of the Editor has been comparatively light and insignificant, and whatever praise or blame may accrue, thereupon, he deferentially submits to the ordeal of public judgment, content to believe, that *he* can never suffer much humiliation who never aspires to overrate his own ability—and that all expectations, of a personal sort, have been fully answered, if it shall happily be confessed he was not wanting in diligence and inclination. In order to convey some notion that his endeavours were commensurate *to* the demand upon him in connection with the *Review* he will simply state that he addressed circulars, at various times, intreating all to come forward who had the object of promoting the spread of science at heart. If the few, who did advance into the very front ranks of his supporters, were indeed valuable supports, he too soon ascertained, from whatever cause, that *they were but few*, and subject, like most classes of individuals in India, to frequent removals where distance rendered communication more rare, if in truth it was not altogether interrupted by the imperative demands of professional duty. One thing however is quite clear, that the machine breaks because there is no unction to the wheels on which it should have been propelled. Blame it is not intended to cast; a simple narration of the truth is the best apology for the failure, and it is not for the Editor, even if he could, to scan too closely, the causes that have produced discomfiture. Each of those who have withheld their countenance has doubtless been instigated by reasons of undeniable validity, but the cessation of patronage naturally gives the death-blow, and all that is left is to make the best of a bad matter by a graceful folding of the mantle which envelopes the prostrate corpse. The task commenced in good humour, and (be it said also without presumptuous expectations) our closing scene shall not belie the pristine disposition, for our *vale* is uttered with a cordial feeling of thanks to those to whose kindness we stand indebted, while without the least taint of bitterness towards any we thus

take our leave of the operation that linked us with so much pleasurable occurrence, with some little, but always amusing, occupation, and with one strong, but not towards any, an unkind, wish, that destiny had otherwise willed it than that *we* should have had to record THE DEATH OF THE ONCE NOTED 'INDIA REVIEW.'

MEMORABILIA OF 1846.

The year 1846 stands distinguished by the number and importance of its discoveries, inventions and Scientific communications to an extent sufficient to fill a large volume. But important as we admit the most of them to be, there are a few which stand out so pre-eminently conspicuous that we cannot refuse a brief space for their insertion.

THE NEW PLANET.

First and beyond all others for the singularity of the circumstances connected with its discovery and the agitation which that discovery occasioned in the scientific circles of France and England we may place the addition of a new planet to our solar system, exterior to the orbit of Uranus. Certain well noted irregularities in the movements of the planet just named, had for many years led the Astronomers both in England and on the continent to the conclusion that some disturbing cause exterior to Uranus could alone account for the anomalous character of its movements. In the latter part of October 1845 Mr. J. C. Adams of St. John's College Cambridge laid before Professor Airy the following paper :—

According to my calculations the observed irregularities in the motion of Uranus may be accounted for by supposing the existence of an exterior planet the mass and orbit of which are as follows—

and orbit of which are as follows— 38.4.
Mean distance assumed nearly in accordance with Bodes Law 1030.9
Mean sidereal motion in 365¼ days 323.34
Mean Long: Oct. 1st 1845,.. .. .. 315.55
Long: of Perihelion,.... .. .. 0.16.0
Eccentricity,.... .... 0.0001656
Mass (that of the sun being unity.)..

On the 10th of Nov. 1845 M. Le Verrier read before the French Institute his demonstrations that no perturbations of the old Planets would account for the movements of Uranus. On the 1st June 1846 he gave his second paper to the Comptes Rendus admitting no other explanation but that of a new planet and stating its Long: to be about, 325° *i e*, within a degree of Mr. Adam's Calculations. On the 31st of August he read before the Academy of Sciences his third paper detailing the elements of the supposed planet.

On September 2d Mr. Adams communicated to the Astronomer Royal a second set of Elements with a comparison between the places as observed and those calculated from both sets.

During the progress of these matters Professor Challis, basing his observations on the elements of Mr. Adams, was diligently occupied in the search for the new planet and between the 29th of July and the end of Oct. had found 8150 stars, and it is stated *actually observed the new planet on the 4th of August, again on the 12th, and afterwards on the 29 September.* Some uncertainty or doubt would appear to have hung over these observations, for so far as we are aware no formal

announcement was made as to the real charactor of the star observed on the occasions named, although one star singled out of 300 observed on Sept: 29th is noted "*seems to have a disk*" and which turned out to be the planet; the undoubted honor of the discovery is therefore due to M. Galle of the Berlin observatory, who, guided by the calculations and conclusions of M. Le Verrier discovered the new planet on the evening of September 23d, being the first occasion on which he had looked for it.

Honours and distinctions were conferred on both these gentlemen by the Government of France, an example which the Royal Society of England quickly followed by awarding to M. Le Verrier the Copley medal, which was presented to him through Sir John Herschell. Proud, however, as M. Le Verrier may assuredly be of the mark of approbation conferred upon him by his own countrymen we are not quite sure that there will not arise a more exquisite feeling of pride and gratification as he remembers that the learned and the noble in science of Britain, whose candour his countrymen had not hesitated to impugn, were yet generous enough to acknowledge and reward his services in the cause of science, and who, through one of the most distinguished of their body, conferred upon him the highest mark of their praise and admiration, their just appreciation of his talent, industry, and perseverance, which have associated his name with one of the most memorable discoveries in the history of science,—the result of the most profound thought and calculation,—a result which, to borrow the language of Sir John Herschell, had been seen as Columbus saw America from the shores of Spain,—whose movements had been felt trembling along the far reaching line of Mathematical analysis with a certainty hardly inferior to occular demonstration.

A NEWLY DEVELOPED MAGNETIC CONDITION OF ALL MATTER

The researches of Professor Faraday have greatly extended the field of his discoveries in Electric and Magnetic Science: one wonder "doth tread upon another's heels, so fast they follow:" scarcely have our minds been enabled to apprehend, with any clearness, the strange truths which his labours have revealed in the various phenomena exhibited in the course of his investigations than we are called upon to contemplate a new developement of the wondrous power of *Him* who made all things and "hath done all things well."

In addition to the great fact which the Professor had made known and illustrated of *the rotation of a ray of light by Magnetic force*, and *the relation of this Electro Magnetic power to various laws of Polarised light*, farther investigations have eliminated a new order of *Magnetic actions* and a *new magnetic condition of all matter*

In the course of his investigations (vide his lecture at the Royal Institution on a new property of Magnetism) there came out, as he somewhat quaintly informs us, a very odd consequence, very unexpected, utterly unlike any thing that he either looked for, thought of, or hoped for in Magnetic action. What this odd consequence was let the Doctor himself explain, for it cannot be more clearly or more graphically done than in his own words.

"You have seen repulsion, here is another more beautiful form. Here is a piece of Bismuth, and I am about, by this silk thread, to suspend it in this little cradle, and then bring it into what I have called the magnetic field, into the place of action between the two poles (*of an enormous horse shoe electro Magnet, capable of suspending many tons weight of iron.*) It is indifferent so long as the arrangement is not magnetic but the moment the two poles begin to act upon it, the Bismuth will point but point in an odd position. By making and breaking contact look how it has swung round. By making contact it will not go round this line, but will swing about that line, and in fact that is the line, which it will at last, take up. Just as the piece of paper swings about between the two poles, so this swings about a little across the poles or at right angles. When you think of the *North and South* of the Earth, and that this substance is subject to the Earth's power it will point *East and West* instead of *North and South*, or across the lines of magnetic force. I let it swing, but you see that the power of torsion is such that it will go by; but before it can pass the next time, I will catch it by the magnet. and you will see it sent back.' Making contact, it is sent back by the magnetic force and will vibrate only across the line. I might show you many other cases of this description: phosphorus will do the same thing. Every body is repelled by one pole or the other if put into a long form, even if composed of several little bits put together. I may take grains of sand, put these into a tube, make them into a long cylinder, and it will stand along the line of force as Bismuth did, precisely contrary to what the magnet does, forming a beautiful contrast to it; and then the phenomena show us that this magnetic force not only has that kind of duality as respects electricity, as respects *Northness and Southness*, but it has another duality, it has that kind of power which makes it magnetic as iron, but in a contrary direction"

The experiment here given was repeated with various substances, and with like effect and result, satisfactorily proving the existence of a newly discovered property of Magnetism and of bodies hitherto concieved to be indifferent to its influence or power: air and vacuum alone appear to be neutral. Of all other matters or substances, not magnetic in the ordinary sense of the phrase, to which the Professor has applied the term diamagnetic, he says it is only necessary that we should "make it longitudinal and then the thing points." To the direction in which this action takes place is applied the term equatorial in contradistinction to that of magnetic substances as Iron, Nickel, &c. which is denominated axial.

Of this newly developed relation of things we are not yet in a condition to form any satisfactory conjecture, so far as relates to the power under which it is effected, but although of its use or function in the operations of nature we may remain for ever uninformed, of this we may rest assured, a power so great, so universal, must have been designed in relation to man for a high and important purpose, and like all God's purposes towards His creatures must be *good.*

CULTIVATION OF SILK IN ENGLAND.

A communication from Mrs. Whitby of Newlands, near Lymington Hants, to the British association fully justifies the hope that the silk worm may be as profitably reared in England as in India, Italy, or France. Mrs. Whitby's experiments began ten years ago on her own estate and together with a detail of these experiments she has exhibited specimens of raw and manufactured silk which in proportion and quality equals the best produce of Italy and France: this has been attested by various eminent manufacturers in London Manchester and Coventry.

Mrs. Whitby commenced by planting various sorts of Mulberry Trees and finds that the dwarf Phillipine is by far the best, producing more

leaf, and from the facility with which its cuttings are struck, being more easily propogated than any other. Mrs. Whitby next procured the eggs of the larger Italian sort of worm of four changes and to the choice of this kind of worm is attributed much of the success of her labours. Making allowance for occasional unfavourable seasons, for labour, machinery, outlay of money, &c it would be found that land laid out for the cultivation of food for this valuable caterpillar would afford a large profit. Hitherto the silk worm has been reared in England only as an amusement, and the difficulty of procuring the proper kind of food at the right time has prevented its becoming a more serious object of attention. Mrs. Whitby has now demonstrated the possibility of obtaining a sufficient quantity of such food at the proper time.

The importance of the subject may be inferred from the value of the silk annually brought to England, £2,000,000, and it is stated that Mrs. Whitby's silk is worth as much in the market as the best foreign silks. Mrs. Whitby has presented to the Queen twenty yards of rich and brilliant damask manufactured from silk raised at Newlands.

We have abridged the notice here given from the Athenæum No. 988 and append the following brief note of what has elsewhere been done in the same field of speculation.

"At the last annual meeting of the Royal Cornwall Polytechnic society scarves where shewn which had been manufactured in Spitalfields from the produce of between 700 and 800 worms kept in an attic room in Truro. In size and weight the worms rather surpassed those of Italy, the cocoons were larger; the quality of the silk when reeled was fully equal to the best imported and the quantity exceeded the Italian average and this in a season not remarkably propitious."

Year Book of Facts, 1847.

Double action Printing Machine.

Mr. William Little of the Strand London has invented and patented a Machine of most extraordinary power and capability for printing,—one which, from the great advantages it offers, is likely to supersede all others at present in use. With increased action more satisfactory results will be obtainable than hitherto from the best constructed Printing Machines. The invention has drawn forth the following observations from the Editor of the Mec. Mag:—

"But, 32 years have elapsed since the proprietors of the Times, which was the first newspaper printed by a steam press, boasted that 'no less than 1100 sheets were impressed by it in one hour.' It was regarded by them as a feat quite unparalled and never in all human probability to be excelled. What a wondrous change have a few years effected! By the persevering ingenuity of Napier, Cowper, Dryden and others, the number of impressions was increased about four fold; and now Mr. Little has carried the increase to nearly *four times four*, such giant strides as this in art are only to be made by giants in Genius. The introduction of printing by moveable types was scarcely itself of more importance than this. It increased amazingly the capabilities of the typographical art but not for a long time to any thing like the extent which Mr. Little's Machine promises to do before another year passes over our heads. Kœnig's name stands deservedly high as having been the first to apply steam power to the art of printing; but equally high, if not higher, should stand the name of him who by his Mechanical skill has enabled steam to do three times more for the art than Kœnig ever realised or most probably, ever dreamt of."

THE GREAT BELL OF RANGOON.

To the Editor of the 'India Review.'

SIR,

Though the ruins of Egypt, and other sites of by-gone greatness, still stand in monumental evidence of the ingenuity and skill of the Architects of more than 2000 years ago; and hieroglyphics, paintings, and records tend to shew that the Egyptians, at least, were not ignorant of mechanical expedients, it is, nevertheless, supposed that the *transport*, if not the *erection* of the gigantic masses of stone, and other materia of which the buildings are formed, was effected chiefly by the union of manual strength, and patient endurance of time-stretched labour. Thus, in the construction of the Egyptian Pyramids, " the huge blocks of stone, sometimes weighing 1000 tons each, were dragged for hundreds of miles on sledges, and their transport, perhaps, did not occupy less than a year; in one case, which is known (?), 2000 men were employed three years in bringing a single stone from a quarry to the building in which it was to be placed."*

The statements of our historians, however, are too frequently founded upon very speculative data. Were more certain information available, if I may judge by the analogy of modern experience, I think it more than probable that the supposed labour of years with the Egyptians, in numerous instances, would be reduced to as many months or even days.

As one circumstance on which my opinion is founded does not appear to have been noticed by any of the writers whose works I have read, and from whom, as contemporaries of the period referred to, the information might well be expected; I will even attempt, as far as my memory enables me, to fill up the blank now existing in *one* section at least of the Annals of Rangoon.

As the traveller approaches this town, the first object of interest which breaks upon the view is the lofty spire of the Shoe Dagon† (or Dagoung) Prah, better known to Europeans as the Golden or Dagon Pagoda. A full description of the Pagoda itself would extend this communication beyond the limit due to the subject—but as the generality of the Burmese Pagodas very greatly resemble each other in their form, architecture, &c., those who have read Col. Symes's inter-

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* " Chambers's Information for the People." 1842, vol. 1, p. 78.

† Shoe or Shuœ, in the Birman tongue, signifies *Golden*. Col. Symes in noticing the singular resemblance which the name of this temple bears to that of the *Dagon* of Scripture (1 Sam. c. 5,) observes " that analogies of this kind, though always pleasing, are often deceptive."

Prah or Praw (identical, it is conjectured, with the Egyptian word of which *Pharaoh* is the corruption,) imports *Lord* and is always annexed to the name of a sacred building.

esting account of the Shoe-madoo Pagoda, at Pegue, may form a pretty correct idea of the appearance, inside and out, of the stupendous and superb temple now referred to; and a short extract, from the same author, will complete, sufficiently, the picture for my purpose. "The temple of Shoe-dagon (says Col Symes),* about 2½ miles N. of Rangoon, is a very grand building, although not so high, by 20 or 30 feet, as that of Shoe-madoo at Pegue. It is much more ornamented. The terrace on which it stands is raised on a rocky eminence considerably higher than the circumjacent country. It is ascended by above 100 stone steps that have been suffered to fall into decay. The situation renders Shoe-dagon a conspicuous object at the distance of many miles"—My own notes lead me to estimate the height of the temple, above the terrace, at about 340 feet—but I will assume the Colonel's supposition (if such it was) at 300 feet, and merely add that I believe the extensive hill on which the Pyramid stands to be full 200 feet above the level of the river. After the taking of the town of Rangoon, by the British, in May 1824, the terrace of the Pagoda became the site of military quarters for European troops; and those who are intimate with the worst traits which characterize British soldiers (and sailors too), will not be surprised to hear that the spirit of destruction very speedily ruled their actions The outer and therefore more exposed miniature pagodas which surrounded the grand building were very shortly defaced, or broken in pure wantonness; and when the belief was excited that they contained hidden treasure, the work of destruction was, of course, renewed with all the additional zeal that cupidity could incite. Nor were their expectations disappointed, as, in several instances, to my knowledge, gold and silver, to the value of more than a thousand rupees, were the fruit of their labour. The success of the men in these instances led to the desire, on the part of the officers in command, to extend operations on the part of the Government, and orders were therefore passed to excavate such parts of the great temple as were deemed likely repositories of greater treasure Engineers, sappers and miners, and all their *aids*, directed and worked accordingly, but without success; for though, after some weeks toil, they opened a large cave, it contained neither gold nor silver. Thus disappointed, the desire to end their efforts by the acquisition of at least a *trophy*, probably suggested the idea of removing the great Bell which was (and is still) fixed at one of the outer gateways of the Temple. The Shoe-dagon, like the Shoe-madoo, had its three or four Bells, one at each gate-way, all of excellent workmanship, but the one just referred to in particular, attracted attention from its immense size, and the extraordinary skill and labour with which it must have been cast. It stood on the N. W. angle of the area, and some idea may be formed of its weight when I state that the metal is more than a foot thick, and the diameter, at the mouth, upwards of 6 feet. It was suspended from the centre of a beam fixed between two pillars, and, when used, was sounded with a Deer's horn. Before its removal was ordered, the

* "An account of an Embassy to the Kingdom of Ava, in 1795, by Lieut. Col. M. Symes" in 2 vols (Constable's Miscellany, 1827)

Madras gold-smiths had cut or broken off many large portions of the rim—the metal being said to contain a mixture of gold or silver. The dispatch of this trophy to Calcutta being decided upon (in 1825), the ordinary means of removal were adopted—but the labour proved one of greater difficulty than was anticipated.

The duty was committed to the usual engineer officers, and companies of H. M. 13th and 38th Regts., with a large native establishment, and the aid of elephants; but notwithstanding the skill and strength thus united, their efforts, in the very onset, proved ineffectual. It was then resolved to construct a low carriage on which to carry the Bell, and one was made accordingly, but, though the rims were of immense breadth, the wheels sank so deeply into the earth, under the weight of the burden, as to become immovable, and this plan was, consequently, abandoned for another. The Bell was thrown on its side and a circular frame-work, of wood, fixed to its apex—which was thus made to correspond in circumference with that of the mouth, for the purpose of being rolled under the drag of elephants and people. But this plan also failed. Another carriage, "upon a new principle," was then constructed, and, after much toil and trouble, the great Bell was at length conveyed to the river-side, where a raft had been duly prepared for its reception, and transport to the good ship "Sulimany." The rafting was the task of no little difficulty and labour.

At this time the feelings of the Burmese, and of the Priests in particular, were naturally much excited at witnessing the removal of a relic so valued; but the priests who had witnessed the labour and difficulty attendant on the progress of the Bell thus far, had strong faith in the assurance that the British would, after all, fail in their attempted sacrilege. Gaudma, they declared, *sat upon the Bell*, and, as its guardian deity, would not allow its removal from the country. How far the power of the great incarnation aided, I will not pretend to say, but the prophetic powers of the meek and amiable priests certainly triumphed over the mechanical powers of the skilful and experienced British engineers and all their powerful allies. The raft was pushed off—but did not go far ere it heeled over, and, in its lurch deposited the holy Bell in the muddy bed of the equally sacred river Irrawaddy. The weight, of course, had been too great for the raft. A death-like silence of some moments told more than tongue could utter. Can it be a matter of wonder that the people who had so recently, for the first time, witnessed the amazing powers of a steam war-boat, stemming their rivers against wind and tide, and who had witnessed and experienced the amazing powers of the British on so many previous occasions, should, in this instance, attribute our failure to the divine interposition of their deity?

I will not assert that the Europeans who had thus *lost* the Bell, could not *recover* it—but they certainly evinced no desire to make the trial, and there, embedded in the river, it remained for some months, till, I think, after the ratification of the treaty of peace (dated the 24th of February 1826), when the Burmese, under special permission, were allowed to recover the Bell, and restore it to its original place.

And now, Sir, I arrive at the *gist* of my statement. The Burmese, under favour of the sanction obtained, without the assistance of en-

gines or engineers, the only adventitious aid sought by or allowed them being that of the gun-boats, not only recovered the Bell from the bed of the river, but effected its safe return to the spot from whence it had been removed, in a lesser number of days than the British had taken weeks over the task of its removal to the river-side! How they effected this Herculean labour, I am unable to describe, for, though at Rangoon at the time, my duties prevented my witnessing the recovery and return of the Bell—but of the fact, in common with all who were living within the cantonments, I had the most satisfactory assurance, and can, therefore, now testify accordingly.

With this instance, of what a rude untutored people, like the Burmese, can effect in the present day, are we not justified in assuming the extreme probability of the labours of the ancients, in effecting the transport of their building materials, and their subsequent erection (as for instance in the building of the Egyptian pyramids), having been of shorter duration than that assumed by our historians?

But though I can state nothing of the *modus operandi* pursued by the Burmese on this occasion, there are, no doubt, many living, who can; and such communication, I beg to suggest, would form an interesting article in a future number of your interesting journal.

In your last issue (p. 570) the interesting article of "W. B." mentions the tradition of Ullum Prah having, in one night, effected the erection of a large covered frame-work of Bamboo, which, in the distance, presented the appearance of a finished Pagoda; and the energy of the Burma character fully justifies belief in the probability of such an achievement.

It is a question, however, whether the British, in the present day, could accomplish the same task, in the same space of time, though the Egyptians, in their time, would, no doubt, have been a fair match for their brother pagans of Ava.

We Europeans of the present day, are, doubtless, a constructive and a wonderful people, but we might, nevertheless, if we sought the information, learn much from the semi-barbarian and idolatrous Burmese; and if the Egyptians of old could but rise to life to instruct us, we might learn more still!

Yours obediently,

THOMAS HORTON

Calcutta, August, 1845.

NOTE.

Extract from the DIARY *of a lady Traveller, obligingly furnished at the request of the Editor.* "I went under the great Bell, which, in circumference, is about 18 feet, and its thickness 8 or 10 inches. This immense Bell, during the time we possessed Rangoon, took the English Army *three weeks* to convey it to the river side for the purpose of embarking it, but after all their trouble, by some means, it sunk in the river, and there they left it. As soon as peace was proclaimed, the Burmese dragged it out, and replaced it in its old berth, *in less than thirty-six hours.* It is situated in the compound, adjacent to the great gold pagoda on the hill." The great Bell at Rangoon is, however, outrivalled in bulk by certain Bells in Europe. The "great Peter" or Monster Bell for York Minster [illegible]

for instance, cast, in 1845, by Messrs. Mears of Whitechapel (at whose foundry the great Bell of Montreal, Tom of Lincoln, and St. Paul's Bell were cast), measures 8 feet high, 8 feet 4 in. in diameter, and 7 inches thick at the sounding bow; and exceeds in weight Tom of Oxford by 2 and Tom of Lincoln by 5 tons. The metal was 12 days cooling, i. e. from the 18th of Jan. (when cast) to the 30th—(vide "Illus. Lon. News," Feb. 15th 1845.) The civil Engineer whose skill has, doubtless, long since effected the *removal* and *erection* of this truly great Bell, we are led to believe encountered very little trouble in the performance of his duty. Why the great difficulty described by our respected correspondent, in the mere removal of the, comparatively, small Bell at Rangoon, we are at a loss to conceive.—*Ed. Ind. Rev.*

THE GOLD PAGODA ~~OF BURMA.~~

To the Editor of the 'India Review.'

DEAR SIR,

As a subject likely to interest many of your readers, I beg to tender for insertion in your journal the accompanying account of the gold Pagoda, and Notes on the supposed origin of its name. The account of the coin was compiled, on the information quoted in the margin for insertion in a little work preparing for publication, but doubt as to the correctness of some of the particulars induced the compiler (through the obliging friendly agency of J. Curnin, Esq.) to refer his M. S. to the highly intelligent Hindoo gentleman, Baboo Soorea Rao (a native of the Carnatic,) whose notes are now appended.

The authorities and the article which they have furnished, standing in juxta-position will better enable your readers to test the accuracy of the account as a compilation from the sources quoted. The original article runs thus:—

PAGOD, an idol deity, contraction of the next word.

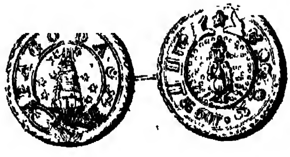
PAGODA, a probable corruption (under various forms from Hindoostanee to Portuguese, and from that to English) of Poot'la (or Boot) *khooda*, an *Idol god*, or *Boot* (or Poot'la) *khanu*, an *Idol temple*, and hence, among Europeans, a common name for any *hindoo temple*, also the common English name of a gold coin, of Carnatic Hindoo origin, the name derived from the pyramidal temple depicted on one side, the correct Moohummudun name

Authorities.

"PAGODA, n. (Pers. *pontghot*, or *boot khoda*) 1, a temple in the E. Indies in which idols are worshipped. 2, an idol; an image of some supposed deity. 3, a gold or silver coin current in Hindoostan." *N. York ed. of an abridg. of Dr. Webster's Dictionary.*

"WHEN the Portuguese, the earliest European Settlers in India, transmitted accounts of their proceedings in the year 1506, they attached the term Pagoda to all Pagan Temples—" Pontgheda" signifying, in one of the Eastern dialects, a temple of idols. From that period the name has been commonly used by Europeans to designate not merely the temple itself, but also the numerous idols contained within it; and in this habit they have been further confirmed by the word

being Hoon (*gold*), and the Hindoo name



Ba'rah (*Boar*), so called, without doubt, after a device of that fabled incarnation of Vish*noo* upon one side of the ancient coinage of the Carnatic, a variety having the device of Ram and his attendants, being called Ram-u'tunku, and another, bearing four *fish*, Muchh-hoon; others bear the figures of Vishn*oo*, Jugurnath, and other deities, and one variety bearing the figures of three Swamees or Fukeers is (or was) more valued than the common Pagoda. Many varieties of the Pagoda circulate on the Coromandel Coast. Accounts at Madras were formerly kept in *Star Pagodas* weighing 52.56 grains and 19 $\frac{1}{5}$ carats fine; intrinsically worth 7s, 5$\frac{1}{4}$d. sterling, but commonly valued at 8s. According to the old Madras system—

80 Cash (copper currency) made 1 Fanam
42 Fanams (silver currency) made 1 Pagoda.

From January 1818; however, by a proclamation of the 7th of that month, "the silver rupee of 180 grains was constituted the standard coin, and all accounts and public engagements were ordered to be converted at the exchange of 350 rupees per 100 pagodas;" and since then the establishment of the Company's Rupee, at the three presidencies, has further confirmed the substitution of silver currency, for the gold Pagodas, in European transactions at the Presidency of Madras.

Looking at the high character of Mr. Prinsep as an authority, the compiler naturally indulged in the hope that the information he had thus thrown together might safely challenge criticism. The notes already re-

which the Hindoos expressly apply to a holy house or sacred building (Bhaga vati) bearing the same sound as Pagoda when quickly pronounced." *Halsted's* "*Investigation.*"

"The name of this coin among Europeans is "the Pagoda;" a Portuguese appellation derived from the pyramidal temple depicted on one side of it. The proper Hindu name is Varaha, which signifies wild boar, and doubtless originated in a device of the boar incarnation of Vishnu upon the ancient coinage of the Carnatic; for the same figure appears as the signet of the Rajas of that country, on some old copper grants of land in the Mackenzie collection.* The Hindu name probably varied according to the image on the coin; thus we find the Ramatanka having the device of Ram and his attendants; and the Matsya hun of Vizyanagar with four fish on the obverse. Other Pagodas have Vishnu, Jagarnath, Venkateswar, &c. on them; those with three swans or figures are of the best gold, and are valued 10 per cent. higher than the common pagoda. "Hun is the common term used by the Muhammedan writers; [illegible] indeed gener[illegible]y the natives [illegible] the pagoda. It [illegible]ies gold in the

* [illegible]e Varaha also appears on some ancient silver coins of Orissa. See Wilson's [illegible]unt of Coin of this type; *As. Res.* vol. xvii, p. 586.

Carnatic language."— Prinsep's Useful Tables Part 1, p. 15. ferred to, and here appended, will shew that he was deceived.

NOTES OR COMMENTS.

In the foregoing article in explanation of the names *Pagod* and *Pagoda* (by which names the gold coin referred to, and hindoo temples generally are called by Europeans, and by the English in particular) it is stated that these words are not originally English, but probable corruptions of Hindoostanee, to which language they formerly belonged, in certain forms, such as *Pootla* or *Boot* (*Idol*,) and *Khanu*, *Temple*, &c. Had the words *Pagod* and *Pagoda* been of undoubted Hindoostanee origin (which I question) the native names quoted would have appeared to be the very probable parents of the English; but the coins to which the names Pagod and Pagoda apply were coined and circulated only in the southern part of India, viz:—from Cape Comorin in the S. to Ganjam in the N. where the Hindoostanee is and ever has been a foreign language to the inhabitants. It is, therefore, improbable that the natives of those parts would either adopt foreign names for the coins in question, or, when interpreting the devices which they bore, assign foreign names to the temple and idol depicted. But it is probable that the names owe their origin to one of the languages spoken in the countries to which the coin was common, that is of the S. of India, as the Malabar, Tamil, Canarese, and Teloogoo, in which languages somewhat proximate resemblances of the names in question can be traced; as for instance in the Canarese word *Appa* or *Apa*, an *Idol* or *Deity*, and the word *Goodee* or *Temple*, common to the Tamil, Canarese, and Teloogoo. It is easy to conceive how Europeans, in their early intercourse with the Indians of the S. when asking an explanation of the figures depicted on the gold coins of the country, and receiving the reply that they were effigies of *Apa* and *Goodee* (or *Deity* and *Temple*) would, by a union of the names,—Appagodee—create the corruption of *Pagod* or *a Pagoda*; and hence as probably would arise the adoption of those names for the coins of gold, as well as for the Idols and Temples of wood and clay. An objection to this surmise may be urged on the ground that the language of Madras and its vicinity, where the Pagodas also held currency, and at which Europeans were early visitors, is and always has been *Tamil*, and that, therefore, it is improbable that the English sojourners of Madras would adopt a corruption from the *Canarese* names; but, even assuming the names to have had their origin in that city, the objection is much weakened by the fact that both Canarese and Teloogoo, as well as Tamil, are, and always have been spoken there.

In Dr. Johnson's Dictionary (Jameson's edition) the words are defined as follows:—"PAGOD or PAGODA—An Indian Idol; the temple of the Idol; the name of an Indian coin, both of gold and silver, usually called Pagoda." And again in the "Appendix to the Report of the select committee of the House of Lords, on Indian Affairs"—(Vol. 2. p. 1538, "glossary of Indian Terms,")—the word "PAGODA" is stated thus:—Perhaps from Pagod, an idol, which is itself a word of doubtful origin. A term unknown to the natives of India, given by Europeans to Hindoo Temples; also to a gold coin, often with an image on it, properly called *Hun* or *Hoon*."

On further consideration of the subject, I am led to think that the words in question may owe their origin to even the *English* language itself! Probability is greatly in favour of the name *Pagoda* being of very early existence as an English word, and it needs no great stretch

of imagination to account for the origin. In their earliest intercourse with the natives, Europeans would naturally regard with curiosity and interest the coins of the land, and the Pagoda, as a gold coin no doubt frequently received in payment on mercantile transactions, with reference to the devices it bears of an idol or *pagan god* on one side, and of a hindoo or *pagan temple* on the other, would, very likely be identified in name with the figures depicted, and thus, in the course of time under those *changes* which Europeans so commonly *ring* on names of things, and on foreign or supposed foreign names in particular, the words *Pagan God* as one of the devices on the coin, may, very possibly, at length have settled into the contraction *Pagod* or *Pagoda ;* which contraction indeed, as probably, originated with the natives who are as apt to jargonize and adopt English words as the English are to corrupt and naturalize native words ; even the severity of British military discipline, and the long training of our native officers having failed to preserve the British words of command in their English purity, as proved by the examples quoted in the margin.* It may be argued, however, that though our Sipahee officers thus corrupt the English words of command, our English officers have not adopted the corruptions, and that, therefore, as little likely are European merchants to have adopted any native corruption of an original English word, or to have changed its original orthography as it is argued they may have done in the instance of the word Pagoda. But it must be remembered that merchants and mariners are not tied to those rules which leave military officers no liberty to change forms either of words or discipline when once fixed by "*the Regulations.*" As the name, however various its changes, never affected the value of the Pagoda as a coin, neither Europeans nor natives would trouble themselves in deciding which of two or more names should receive the preference. Thus, probably, the natives in their early dealings with Europeans supposed that in using the word *Pagod* or *Pagoda* they used the correct *English* name, and Europeans, as likely, after a very few years, would, without enquiring, assume the word to be purely *oriental.* The article under review states the correct Mahomedan name of the Pagoda to be " Hoon (*gold*) ;" but, if by the term *Mahomedan* is meant *Persian* or *Arabic*, it is not correct that *Hoon* is either (v. Richardson's P. & A. Dic.)—the common synonymes for gold in those languages being "*zur*" and "*zuhub.*" It is true that Moosulmans and many other natives call the coin by the name of "*Hoon,*" but (though even so written in the Persian character, on the coin itself) the name more probably owes its origin to the Canarese *Honnoo,* a general term for *Money* and particularly *gold.*—Again, the article states the Hindoo name *Barah* (*Varaha*) to be " so called without doubt, after a device of that fabled incarnation of Vishnoo upon one side of the ancient coinage of the Carnatic ;"—but the fact is that the Hindoos of the Deccan, namely—from Cape Comorin to Ganjam,—call by the name Varaha (*corrupted*—Barah) not only the Pagoda, but many other gold coins, as reference to the few named in

* Native corruptions of English words, from Gilchrist's Dialogues.

A friend,	furung.
As you were,	uj-war.
Attention,	tel-chun.
Change step,	Changetap.
Charge bayonet,	Churt bugnet.
Corporal,	Kupruel.
Fix bayonet,	pes bugnet.
Grenadier,	guran-deel.
Ground firelock,	gran-fullok.
Half-cock firelock,	ap-ka-fueluk.
Lord,	lat.
Mark time,	marten.
Order arms,	urdul-ram.
Recover arms,	rikab-ram.
Stand at ease,	tundel tis.
Trail arms,	tileram.
Who comes there ?	hookum-dar ?

Lukshmee-narain
Ooma-maheswur
Maha-Lukshmee
Sree Venkataiswur
Sree Lukshmee Moosinha
Cunthee-raee
Veera-raee
Sree Ram

the margin * will shew: and what more militates against the presumed origin of the name there is no evidence of the device of a Boar even having been impressed on any coin of the Deccan. The word Vâráha, as the name of the coin now known as the Pagoda, is found in three of the languages of S. India, viz.:—Canarese, Tamli, and Teloogo, but to which of these the word owes it origin, I am unableat this moment to state.

During the Mahomedan administration no money was allowed to be coined according to Hindoo forms—but in conformity with the precepts of the Koran (v. Sale's Trans.) every coin bore the inscription of the name, &c. of the reigning ruler.

The rest of the information contained in the article appears to be correct.

Soorea Rao.

Though the foregoing comments do not set the questions entirely at rest, they are interesting in their character, and valuable as suggestive of the sources from which others who may take up the subject may clear the doubts in which it is still involved.

Your's faithfully.
H. G.

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* The following Postscript from the same intelligent native gentleman came to hand some time after receipt of the foregoing communication:— —*Ed.*:

Since writing the memoranda already furnished, I have discovered a closer resemblance of the word Pagoda to a Malabar name which, to many, will appear too evidently the original of the English word to admit of doubt, or justify further consideration of the suggestions which I have ventured to offer. But though I hope that my notes will further the end in view—that of tracing the origin of the word, I am not satisfied that the word to which I desire to direct attention is really the original of the English word Pagoda, and I therefore leave the question open to the judgment of those who may have better data at command to decide it.

The Malabar name to which I refer is Pugoodee (यगोद्रि), an idol goddess worshipped on the Malabar coast, and held in particular veneration under her forms or names of Mulyal Pugoodee and Yamood Pugoodee. The probability of the name Pugoodee being that by which the Portuguese (earliest European visitors to the Malabar coast) would identify the gold coin from its bearing the figure of an idol, appears unquestionable, but the fact is not established.

The word Pugoodee itself is probably corrupted or derived (according to the grammatical rules of the Malabar language) from the original Sanskrit Bhugalvutee (भगवति), Parvutee (पार्वति), or Bhuvanee (भवानि) names or forms of Siva's consort with whom the goddess Puggoodee of the Malabars seems to be identical.

Calcutta, Sept. 1845. Soorea Rao.

IMPROVED HOLDFAST FOR THE SLIDE REST OF A LATHE.

To the Editor of the 'India Review.'

Sir,

I have lately had described to me a very useful improvement in the holdfast, or tool-holder, of the slide rest, which deserves to be more generally known, and when brought to the notice of turners, whether pro-

fessional or amateur. will I think, be found preferable, at least for light work, to those ordinarily in use.

I enclose two drawings, from description only, which will serve to explain, with sufficient clearness, the principle of this improvement, for which we are indebted I believe to Professor Willis of Cambridge, whose many ingenious improvements and contrivances connected with the Lathe for Osteological and other purposes have been so highly appreciated by the scientific at home.

Fig 1. A. B. [Plate 46] is the upper bed of the slide rest—that on which the tool is fixed.

C. is a strong stout screw pin fixed in the bed. the upper part only being tapped,

D. is a triangular block of iron or brass with a socket or stem E rising from its centre. There is a hole through the whole length of this socket to receive the screw pin C.

The cutter, or tool. is placed between the bed and this triangular block or holdfast. The screw F. serves for adjusting the holdfast to the various thicknesses of the cutters and to perfect parallelism with the bed. A washer G and a strong ring nut completes the tool, seen all together in Fig. 2.

The same letters refer to the same parts in both figures.

The advantage of this form of holdfast is that of its allowing the cutter to be adjusted to *any* required angle or position with respect to the work in the Lathe.

The triangular form is that given by Dr. Willis, but with all due deference I submit, that a square one would be better; it would extend over a greater portion of the tool and allow a shorter and steadier adjustment of it to the work, which in metal face turning especially, is essentially necessary to prevent what is technically called *chattering*.

Your's obediently,

A MECHANIC.

ELECTRO-GALVANIC RINGS.

To the Editor of the 'India Review.'

SIR,

It is quite astonishing to find that things which have been very recently discovered by the learned and the knowing in modern Europe, were known in this country from time immemorial. They may not *now* be found in the complete and unmaimed state in which they originally came out of the intellect of their authors; still the mutilated and the broken condition in which they are at present observed, justifies us to conclude that they are the shattered remains of truth long forgotten, and buried under the waves of oblivion. Long before immortal Newton was led by the fall of an apple to discover the law that "regulates the sky," our sages had mentioned it in their own works, though not with an equal degree of distinctness and fulness. Ages before intellectual Locke had the ability and the courage to force the dialecticians of his time to regard the senses as inlets to human knowledge, the word for "sense"—literally signifying what the philosopher had the reputation of discovering, had existed in our

language. Instead of going through the whole range of instances of a similar kind, I have the pleasure to mention one in the following, of not a little importance, and of a very curious nature.

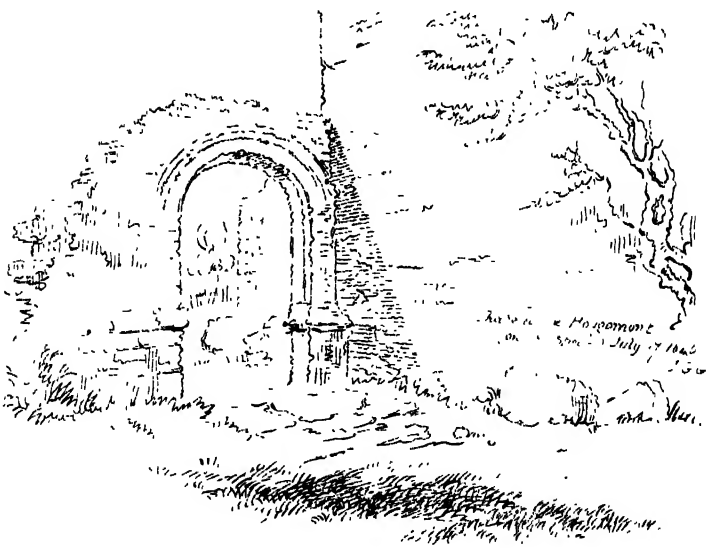
The *Electro-Galvanic rings* which, having been lately advertized, have, on account of their healing influence on nervous disorders, caused a great noise in the cycles of the European community here, were, at an ancient time, known in this country and brought into use in some form or other. To confirm what we have asserted, we have bundles of facts before us, and things daily observed amongst the people in India. The vulgar and the ignorant in this country do generally use metallic rings, with a view to have some *particular* nervous diseases cured. It is naturally to be expected that the way in which they do it, is not exempt from superstitious rites. Now the human mind being so constituted as to conclude the whole of a thing to be false, because a part of it is so, the educated and the more civilized have regarded this practice as foolish and useless. But whether the learned laugh at it or not, there it is; that the people have often recourse to it, our senses bear the testimony; and they would not have recourse to it, unless they had found it to meet their desires. Hence its efficiency remains unaffected by the censure of the scholar. The uneducated, quite regardless of the sneers of others, are, however, accustomed to have the said rings in certain cases, though they are entirely ignorant of the scientific principle on which they act. They do thus unconsciously act the part of philosophers; and it must be confessed that they really derive much benefit from them, for many of them have assured me of it. It is to be mentioned however, that in making them, they are not confined to one metal. Often it is made of copper, sometimes of silver, and iron not seldom, though this, it is probable, is done in ignorance of the mode of action and metals may be used which do not produce any action whatever when in contact. The rings are generally worn on the great toe, but not unfrequently also on the inferior toes. I have been given to understand that the men in this country have recourse to them in the following diseases,—hydrocele, rheumatism, piles, and elephantiasis. I have already said that the way in which they do it is often tinctured with superstition, an instance of which is to be found in the fact that they now and then make a ring out of the copper of a pice which bears the trident of Shiva, as if it were more efficient than all other bits of copper, because of the sacred sign it has. They do sometimes also, I have been told, make the ring consist of a mixture of all the eight metals that have been anciently known in this country. They do it, either because they are accustomed to think that there exists some secret virtue in such an amalgamation, or because from their ignorance of the particular mixture required, and their anxiety to prevent all mistakes, they have recourse to a general combination of all the metals they know. I have been lately informed, though scarcely remember having seen, that sometimes two rings, one of copper and another of zinc, are put on together, hence very closely resembling the European ones, which differ from them only in the circumstance that they are formed of a *mixture* of the said metals. In this case, I believe, the Indian and the European rings are equally sure of their success. The latter do scarcely bear any superiority over the former.

From all that has been stated in this short article, it may be legitimately inferred that in ages long past there did some theory exist in this country, of which the above mentioned remedy for nervous diseases has been a practical result. Time made the supposed speculation to wear away : but the application is not yet forgotten.

Yours, &c.,

AN EX-STUDENT OF THE FREE CHURCH INSTITUTION.

A RECENT GLANCE AT 'WATERLOO.'



(Extract from Home Correspondence.)

" Well, my dear brothers!—look at the accompanying leaf of my pocket book,* and see WHERE it was written !—ha ! *that's* something in a man's life, after more than half a life of talking about it!—as I wrote (most impudently—for no body else had done more than put their *names*) in the book, kept to register visitors at the foot of the huge mound

* On the back of which appeared the hasty little sketch we have endeavoured to transfer to our page, and in the margin the following :—

"A scratch of old entrance in the ruins—the road to the memorable orchard is *through* it, to the right. The great heavy *gate* of *main entrance* against which the musketry of the French poured torrents of bullets is on *this* side, just opposite. I stood with my back to it."—Ed.

where the Belgic Lion rests his gigantic paw upon a globe, on the top—

> Our dreams of boyhood come at last
> To be *substantial* things and *true*—
> For thirty years of dreaming passed,
> I stand, at length, on *Waterloo!*
> And see, with now undreaming eyes,
> Its harvest wave, its tombs arise!

I need not tell you that it is impossible to convey adequately the feelings with which, for the first time, a thoughtful man stands upon "this grave of France, this deadly Waterloo!" — It seems a struggle between imagination and the senses! Is it real? or a dream? Do I indeed walk over that dreadful battle field? Can this be Waterloo? Is yonder petty farm La Belle Alliance? Is that the road to Quatre Bras? Am I gazing upon La Sainte Haye? Do I stand upon the grassy death bed of Picton?—I did: and Oh shame to Britain! that consecrated spot, as well as the sod where the limbs of Ponsonby did honour to the earth, *that* spot has nothing to mark it except a miserable road-post which tells the way to Havre.—If I had never written another line of verse I should have scribbled something then! as I did:—

> Tarry! or move with reverential tread!
> And let thine eyes and let thy spirit dwell
> Upon the sod where gallant PICTON fell.
> E'en *here*—oh earth, how honour'd by the dead!
> —What honours *him?* what trophies here are spread?
> The name, the glory, and the spot, to tell?
> What Bust or urn, the trump of Fame to swell?
> —Nothing: yon crumbling road-post serves instead:—
> Now—were I wealthy (and, for this, alone,
> Some generous hearts will grieve that I am not!)
> I would not pass from this so hallowed spot
> Till I beheld its first recording stone
> Deep laid—a structure ne'er to be o'erthrown,
> And only with the *world* to be forgot!—

On leaving old Guines, the rapidly extending railway facilities between France and Belgium tempted me to come this route on my return to London, that I might snatch a peep at the magnificent Cathedrals and Churches (wonderful things themselves!) in which the miracles of Rubens and the French and Flemish painters fill the eye with beauty and grandeur, and the mind with astonishment. So I came *en Diligence* through St. Omer to *Lille*, a town so infernally fortified, so tremendously defended by the utmost genius of Vauban that I only wonder it was *ever* taken. In fact, it stood a three or four years seige, and might again, but for Congreve rockets and starvation.

was kind enough to take me to Waterloo "in a snug little carriage, like Fanny of Tinmot," and the day will be a marked one in my mind for ever. True, I have outlived the *furor* of admiration for military glory, and

have a tenfold greater reverence for *Peace*,—but I reverence the brave who die in their duty, and there is food for abundant and absorbing reflection upon the field of that dreadful struggle.—It was a heavenly day, just noon, when we left Brussels by the Boulevard de Waterloo, avenued, as usual, with tall trees, and a handsome line of buildings. The road after about 2 miles begins to skirt the forest of Soigne (which Byron, by some strange blunder, or wilfulness, calls *Ardennes!*) but can scarcely be said to run *through* it except twice for a few hundred yards,—but keeps, as I have said, skirting it, for seven or eight miles, at intervals. In fact this wood was once immense, and ran right up to the field of battle in 1815, but has been cut down to a great extent since. The King of the Netherlands gave 1000 acres of it to our " iron Duke," who first cut down " like winking" and then sold the whole " like bricks." The country is of one prevailing character, *undulating* gently all the way from Brussels to Waterloo, with several new villages, fertile fields and gardens—sugar manufactories (from Beet root) and some large deserted ruinous looking houses, one marked "*Hotel de Cintra*" with every window (like its namesake the *convention*) *broken*—a desolate sight.—The country generally however is cheerful, and populous. You pass clean cottages and farm-houses, and huge *charettes* (carts) loaded with billots of wood from Soigner and coal from Charleroi, and, as you draw near the memorable field, some good sized habitable houses present themselves—especially one new and very large in Waterloo itself; that *once* so pretty hamlet, in all respects, is now much increased, running on indeed until almost joined to another long straggling village, Mont St. Jean. The truth is, and one regrets it, great external changes have every where taken place. The Church of Waterloo seems to me almost a new building, it is so " restored" and beautified, although, *within*, the monuments (simple unadorned slabs reared by surviving brother officers) record the names of the fallen, down to ensigns, and therefore speak to the eye and the heart with the voice of *their own day*. We were advised not to stop at Waterloo in going, but (on the Lady's account, who is a poor walker) to drive on to Hougomont. A short turn from the main road (the road to Nivelles) brings one to the ruined chateau, that unintended fortification which, manned by the stubborn soldiery of England, proved the bulwark of Europe against France and Napoleon! It is astonishing how chance (if there *is* such a thing) had fitted that old house, with its garden and orchard walls, to stand the sort of siege it did, as long as the hearts within kept good and stout—as they did, to the last.

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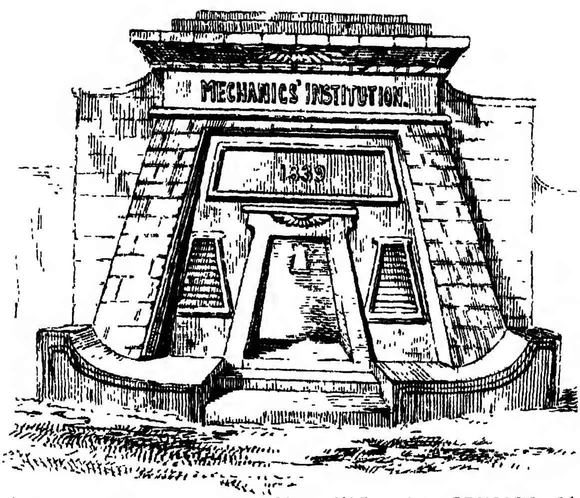


THE CALCUTTA MECHANIC'S INSTITUTION.

In a spirit somewhat kindred to that "fellow-feeling" of the adage, a bond of fraternity—arising from a similarity of fortune or of misfortune, of high hopes, great expectancies, good intentions, and laudable aims, ending in a lamentable downfall, we, in our own expiring hour, are induced to place upon record, and thus carry down with us, in this our literary cemetry, some slight notice of an Institution which, springing up amidst popular applause and enthusiasm, and apparently destined to effect wondrous changes and improvements in the middle and lower classes, and provide gratification for all, has already, like a visionary phantom, passed from before us. We allude to the Calcutta Mechanic's Institution.

We need not here dwell upon the utility or desirableness of an Institution of this kind in a community so backward in all those concerns which such Institutions are intended to advance. Judging by the interest created on its establishment, and the flock of upwards of four hundred members to its support, these appeared to be sufficiently understood and appreciated at the time. We are not to be its commentators, but its brief historians.

The Calcutta Mechanic's Institution, we believe, owed its origin, in the beginning of January 1839, to the fertile and benevolent minds of the Rev. T. Boaz and Dr. Frederick Corbyn, and the realization of the project was determined upon at a meeting of gentlemen (who afterwards formed a part of the committee) held at the residence of Mr. W. Byrne of the Parental Academy. A Prospectus was accordingly drawn up by Mr. G. Grant, who, during nearly the whole period of the Institution's duration, acted as its Honorary Secretary, and to whose indefatigable labours it was by all admitted the Institution mainly owed its life and support, under difficulties which usually bring such projects to a precipitate termination.

On Tuesday evening, the 26th February 1839, a public meeting, at

which Sir John P. Grant presided, was held at the Town Hall, when after many excellent addresses by the hon'ble chairman and other gentlemen of eminence and talent present, it was finally "Resolved" that the Institution should be established, and the following gentlemen constituted its officers :—

PRESIDENT.—Sir John Peter Grant.

VICE PRESIDENTS.—Rev. T. Boaz and Dr. F. Corbyn.

TRUSTEES.—Messrs. W. Byrne and E. Grey.

TREASURERS.—Union Bank.

SECRETARIES.—Messrs. G. Grant and C. Grant.

COMMITTEE.—Messrs. W. P. Grant, J. Middleton, H. Woollaston, W. Rushton, P. S. D'Rozario, Rev. J. Campbell, Rev. W. Morton, Capt. C. J. Crane, Dr. H. H. Spry, Messrs. G. T. F. Speede, J. Graves, W. H. Perkins, W. Matthews, Lieut. M. Kittoe, Baboos Tarrachaund Chuckurburtee, and Ramchunder Mitter, Dr. J. McLelland, Messrs. N. Grant, J. M. Vos, W. Carbery, J. Morris, M. Crow, and Rev. J. Atkins.

At the close of the meeting upwards of 700 Rs. were subscribed in the Book of Donations, and 60 names enrolled as members of the Institution.

A commencement so auspicious seemed to promise a future which should "flourish as the vine, and the cedars upon Lebanon." The public mind was taken ; and for a season the popular excitement and interest were at the highest. The pressure upon the Secretary for the supply of tickets, previous to the first Lecture, more resembled that upon the benefit night of some popular actor than the sober workings of an educational establishment.

The price of the yearly ticket of membership was limited to 5 Rupees—a sum so inadequately low as, in our opinion, to have laid the foundation for the ruin of the Institution.

With a fund of between seven and eight thousand rupees, a small library of Books (all gifts) and a code of suitable Laws, the Institute now fairly started on its course ; the theatre of its early operations being the Town Hall. Here Mr. Middleton, then principal, we believe, of the Hindoo College, commenced a series of interesting Lectures on "*Astronomy*," if we remember rightly, three in number. These were followed by others from Dr. McLelland on "*Ichthyology*," and by Captain Crane on, "*Mechanics*" but these gentlemen were so little pleased by the uncourteous reception their talented and valued labours received at the hands of some portion of the public press, as to discourage their continuance. The publicity of the Town Hall being found objectionable, and the expense considerable, the committee entered into an arrangement with the proprietor of the *Sans Souci Theatre* (now the *Auckland Hotel* in Old Court House Street,) for the use of the Theatre and rooms on those nights not appropriated to the public. The Lectures were now resumed by Mr. G. T. F. Speede, who delivered a short series of an interesting character upon *Agriculture*. These were followed by Mr. Clint (present principal of the College at Lucknow) on *Pneumatics*. The services of a stipendiary Lecturer, Mr. Anderson, Civil Engineer, were then engaged, whose labours were alternated between teaching a class which he had opened, in *Mathematics*, and lecturing to the members. Mr. An-

derson, in the course of a short time, was succeeded by Mr. Montague, a young but more able and energetic preceptor.

During all this time the committee had not been idle in their endeavours to obtain a place of permanency, which the Institution might call *its own*. Premises, though small, excellently situated, were at length found in Government place (opposite the Government House,) and about two thousand roopees of the fund set aside for the expenses of altering, adapting, and fitting them up as a Lecture room, with side apartments for Library and class rooms. The latter were, however, soon abandoned, as being confined and damp.

One, interested in the Institution, conceiving that the ordinary front to so small a building would necessarily have a meagre and contemptible appearance, suggested that an Egyptian façade would be somewhat more imposing, and submitted an amateur design for the purpose. A subscription was immediately raised amongst the members of the committee and some other gentlemen interested in the proceedings, to defray the extra expense thereof. Hence the "Sarcophagus"—by which name those whose taste did not approve, were pleased to distinguish it. We believe the term, figuratively, well applied, for there the Institution may be said to have died, and there to have been *entombed*.

From the *Sans Souci* the Institution had been removed to Mr. Voss's premises in Tank Square, where the services of Mr. Siddons, having been obtained, that gentleman delivered a series of interesting and instructive Lectures on *Physical Science* and *Natural Philosophy*. On completion of the new, and as it was hoped permanent premises, the Lectures were resumed by, we believe, Dr. Brett, who delivered two of an intended popular Series upon "*The Eye*." Dr. Brett was followed by Mr. G. Grant on "*Perspective and the Importance of the Arts of Design*" (afterwards published in the *India Review*,) introductory, as it was stated, to the opening of a class in *Drawing and Perspective* by the Lecturer's brother, Mr. C. Grant. Mr. G. accordingly opened two classes with upwards of seventy scholars, to a fluctuating number of whom, for the four years after duration of the Institution, he devoted two evenings of the week.

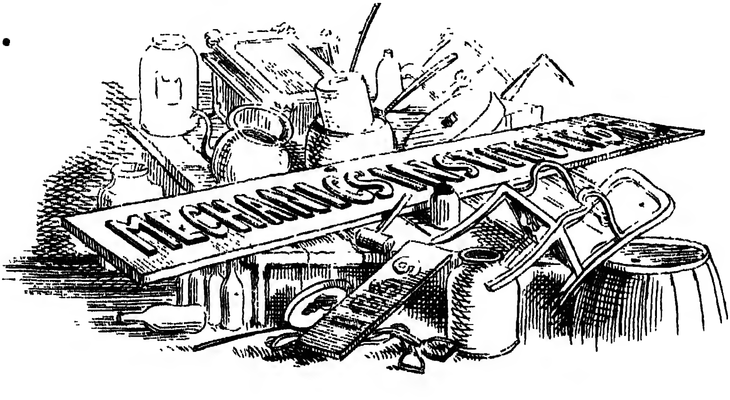
An interesting Lecture by Dr. Mouat, on the all important subject of "*Mind*," and another by a Mr. Nash on "*Phrenology*," were followed by Capt. Boileau's course "*On Suspension Bridges*." These Lectures, which extended to six in number, and were afterwards published in one vol. 8vo., it was thought, from their close agreement with the objects and character of the Institution, would tend to draw attention and more prominently mark the nature of its proceedings. But alas! we have known Capt. B. step to the lecture table with an audience of six persons to receive him! No. As "one swallow does not make a summer," so neither can *one* class (for Mr. Montague's had long ceased) and *one* Lecturer make a Mechanic's Institution. That of Calcutta was dying from inanition. Measures must be taken to resuscitate—to stir up the dry bones. A Town Hall public meeting was accordingly convened, and the powerful advocacy of Mr. George Thompson, then in Calcutta, and other friends of the Institution obtained to plead its cause—induce a rallying to its standard—a re-

cruiting of its strength, to save it from annihilation! The effort was partially successful,—a temporary animation was infused into its spirit —but it was only temporary.

The stipendiary services, however, of Mr. Siddons were again decided upon and obtained, and a fresh course of lectures commenced, which were interesting, instructive and attractive; but circumstances interfered with Mr. S.'s long continuance, and from that time to the close of the Institution the committee were indebted—first to Mr. Montague for a course of very sensible and practical Lectures on "*Education*,"—to Mr. Robert Smith for two more upon "*Paper*" and "*Cotton*";—to Dr. Eveleigh for two or three upon "*The Chemistry of Agriculture*," Mr. Aylwin for one upon "*Commerce*," and Mr. S. G.T. Heatly for a short course upon "*Heat*."

But all was in vain: the 'commerce' of the Mechanic's Institution was at an end;—it was *bankrupt;* the 'heat' of its system had long departed, and the warmth of its one-time numerous friends was scarce perceptible. Once again, however, a desperate effort was essayed to stay the threatened disaster. Fresh allies poured into the field, bringing with them the usual high hopes and sanguine courage of ungalled troops;—but FATE, that oft-times cruel hero, had sealed its doom, and like our own "Iron Duke" on the field of Waterloo, when witnessing the final, ineffectual, but yet raging struggle of the infuriated hosts of France, had already 'closed his glass'—for the field "*was won*."

—— Reader—should you desire to know further, we refer you to the officers of the "LYCEUM"—into which more genteel name (for little more remained than a name) the Mechanic's Institution finally merged. Of this Institute (the Lyceum—which has its room or rooms in the Metcalfe Hall,) and its doings (if there be any) we know nothing,—and need only now add that of the former, a certain, "modern antique" little building—a European tailor's shop, on the east side of Government House, which, Mummy like, exhibits *Egyptian features* above through its cloth, remains to mark its one-time locality,—whilst at a *Bickree-wallah's* door in the Bow-Bazar, amidst broken chairs, tin pots, picture frames and rusty nails, may even now be seen, fallen and prostrate, the last remnant of its name—the one-time promising and honored "CALCUTTA—



ST. PAUL'S CATHEDRAL CLOCK.

In another part of the present number we have laid before our readers a brief account of the new Cathedral of St. Paul, and now feel some degree of pleasure in adding a few, and we trust interesting particulars, respecting the great clock, which has lately been added to the tower, and now, pointing with its antique looking fingers to the passing hours, sends forth its warning voice to the world around, as though anticipatory of the solemn admonitions of the Preacher within, and to tell the thoughtless hearers—like Bacon's brazen head, "Time is—time was—and time is past."

This instrument, the largest and we doubt not the most perfect of the kind in India, is the production of Mr. Vulliamy of London, whose skill in Horology and whose classic taste in all that pertains to works of art, have long distinguished him as a valuable member of several learned and scientific societies at home.

Externally the clock presents two faces, one to the North and the other to the South. It is perhaps to be regretted that the original design did not include a third towards the East, where an increasing population would have considered it no mean acquisition, and who now for the most part obtain but an oblique view of the dials, though they may hear the "passages of time" as clearly no doubt as their southern and northern neighbours. In this respect St. Paul's clock stands distinguished above its fellows of St. John, or the Kirk of St. Andrew, being furnished with a chime of four Bells for the quarters, and one of greater dimension for the sounding forth of the hours.

The dials are square, 8 feet in diameter; each formed of a solid block of slate, between three and four inches thick. The centre parts of the dials are sunk so as to admit of the hour hand being laid below the general surface, thus enabling the minute hand to be placed much closer to the dial than is usual when they are formed in the ordinary way, —an advantage of great importance, whereas in this instance, there is great exposure to the violence of the wind and other disturbing causes. The figures and divisions are cut or carved a little way into the slate after the manner of the Egyptian Hieroglyphics: this tends to preserve the figures and divisions of the dials from any alteration when the usual wear and tear of time may render painting and gilding necessary. Ornaments are carved also in the four corners in appropriate harmony with the style and architecture of the building. The hands are also in this respect of a pattern which gives a suitable effect to the whole of this portion of the work.

The Bells, as we have stated, are five in number, of the following dimensions and weights. The measurements are taken across the centre from lip to lip :—

		Diameters.		Heights.		Weights.		
		feet.	*in.*	*feet.*	*in.*	*cwt.*	*qr.*	*lb.*
Quarters.	No. 1	2	$7\frac{1}{2}$	2	$2\frac{1}{4}$	7	1	18
	„ 2	2	8	2	$2\frac{3}{4}$	7	2	20
	„ 3	2	$11\frac{1}{2}$	2	3	9	0	0
	„ 4	3	$1\frac{1}{2}$	2	$4\frac{1}{2}$	10	0	18
Hour	.. 5	4	5	3	$11\frac{1}{2}$	25	3	4

The Bells were cast by the celebrated Bell Founder, Mr. Thos. Mears of London, and are fine clean specimens of a very difficult art. The great or Hour Bell, besides the name of the founder, bears the following very appropriate inscription:—"Their sound hath gone forth into all lands."

The chimes, as originally arranged, were not of a very pleasing character, and left an unsatisfactory effect on the ear: they were therefore removed, and the present more musical and harmonious chimes, arranged by the Rev. Mr. Pratt, were substituted. For the gratification of our fair friends, and those readers who may be musical, we have the pleasure of annexing the music of the Bells as now struck at the several quarters, with the continuation of the 4th quarter, giving the effect of the Hour Bell as it follows an octave below the closing or key note.

One peculiarity in the present arrangement is worthy of notice. The first and third quarters, (*i. e.*) the odd quarters, terminate with the four notes descending in succession from the highest to the lowest, leaving, though not with an unpleasing effect, an impression of incompleteness, according with the portion of time which each chime is intended to indicate: these two chimes may be readily distinguished from each other by their different lengths. The second and fourth chimes terminate with the four notes ascending in succession from the lowest to the highest, the last being, as we have said, the key note of which the fifth or Hour Bell is an octave below. It will be at once seen, therefore, that the second chime, terminating so differently to the 1st and 3d, may be easily distinguished from them without the trouble of counting the strokes, and the 4th has the distinguishing mark of the Hour Bell following and striking in harmony with the closing note.

The space allotted in the tower to the clock, its various parts and the bells, is divided into three distinct apartments, of the general arrangement of which Plate 47 will afford our readers a clear conception. The first contains the pendulum and the several pullies and rollers which lead the ropes attached to the barrels, three in number, in different directions to the wells in three of the corners of the tower, where the moving powers or weights are suspended, and by the gradual descent of which the various motions of the clock are produced and maintained.

In the second stands the clock itself, placed on a massive frame work of wood, with its multifarious wheels, pinions, and levers, cranks and bell rods, serving to connect its movements with the Bells which are mounted in a cast iron frame and fixed in the third room above.

The Escapement, or that part of the movement which communicates the transmitted motive power to the pendulum, and serves to sustain its alternate vibrations, is of the *dead beat* order, and of the kind technically known as the pin wheel escapement. This is, we believe, an improved adaptation of an old French invention by *Lepaute*, and we doubt not familiarly known to our musical readers, being that invariably adopted in the little time beating instrument called a metronome.

The Pendulum is about 13 feet long and carries a solid disc of cast iron weighing 150 lbs., and performs each vibration in 2 seconds of mean time.

The great length of the rod and the mass which it carries insures great accuracy of performance, and serves to counteract any sudden influence on the going likely to be exerted on it by the striking or the action of the wind on the hands.

The moving power of the clock is a weight of about 68 lbs, and this is found to be quite sufficient to maintain the motion of the pendulum vibrating on each impulse through an arch of 2° 15′ on each side of the centre, and for discharging the quarter striking work every 15 minutes.

The weights attached to the quarter and hour striking barrels are of course much greater than that required for the going part, being respectively about 11 times heavier for the quarter and 9 times for the hour striking parts. The necessity for so great a disproportion in the weights for the going and striking arises from the great additional labour performed by the latter in transmitting sufficient force to the bell hammer through the various cranks and levers by which the motion of the hammers is effected.

A silvered plate on one side of the clock frame bears the following inscription :—

"*This clock was made by order of the Reverend Father in God Daniel, Bishop of Calcutta, by B. L. Vulliamy, F. R. A. S. & R. G. S. Clock Maker to Her Majesty the Queen, and to their late Majesties George the third, George the fourth, and William the fourth, for the Cathedral, Calcutta. London, Anno Domini*, 1844."

The clock is enclosed in an oak panneled case as a protection against dust.

The distance of the Barrels from the first of the pullies which lead the ropes to the weights in the wells not being sufficient to insure the regular coiling of the rope on the barrel, it was found necessary to adopt some plan of obviating the evil in order to obtain the number of coils required for the time of going and striking. This was happily accomplished by causing the rope to pass under a roller, equal in length and diameter to the Barrel itself, instead of under a pulley which would have confined the rope to a central point under the barrel.

This mode was farther improved by a suggestion of Col. Forbes, who has taken a deep interest in all that relates to the clock. By giving to the roller the figure of two truncated cones, with their bases meeting in the centre, the desired end was obtained, the rope having now a tendency to spread more equally over the barrel in the operation of winding.

Of the entire expense of the clock and its various parts it is perhaps

not possible at present to determine, but we learn that, independent of the labour and cost of erection, and the many incidental charges attending the outsetting of such a machine, the following are the charges already incurred :—

Clock.........	£	675	10	0
Bell frame ...	£	231	18	3
Bells		448	0	0

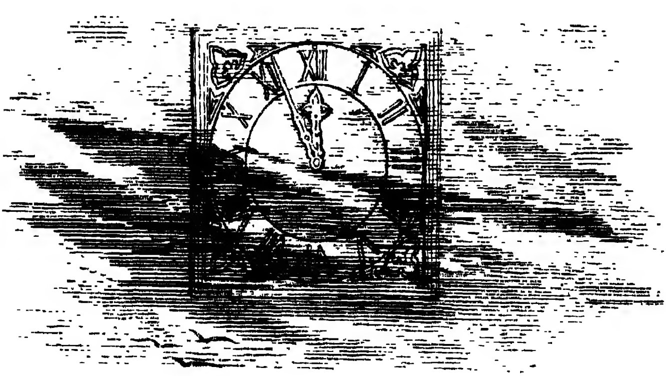
The whole of the works were erected by Mr. George Grant, Watch and Clock maker of Tank-Square, in whose charge the clock has been placed, and by whose kindness we have been enabled to lay before our readers the foregoing account.

The erection of a public Clock is a great public benefit, and we heartily congratulate the good Bishop and the public on the boon bestowed and received. It is a noble instrument and reflects the highest credit on the knowledge and ability of the artist who produced it, and not a little on him who has so well and so faithfully seconded the design of its author. It is now fairly abroad in the discharge of its various and important duties, and may be regarded as a great moralist—an elevated teacher,—one whose hands, we trust, are destined to carry down to future ages a faithful record of the movements and the course of time, and whose voice, unbroken in the lapse of years, shall be heard pouring forth the solemn sounds of warning,—of admonition, remonstrance, and exhortation to the giddy, the thoughtless and the worldly, and with an unquestionable authority telling of the onward, slow—but certain march of that dread power—

> " Before whose breath like burning flax
> Man and his marvels pass away,—
> And changing Empires wane and wax
> Are founded, flourish and decay !"

and for whom a like fate, no less certain and inevitable, has been determined—when the spoiler shall cease from his labours and

" TIME SHALL BE NO MORE."



SELECTIONS.

Description of Clement's Improved Lathe, for which the Society of Arts awarded the Gold Isis Medal, 1828.

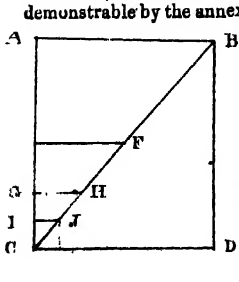
Preliminary Remarks.

It is evident, when the mandril of a Lathe, having a metal plate fixed to it, turns round with a uniform motion, and the slide rest which carries the cutter is moving from the circumference of the work to the centre that the quantity of metal passing over the edge of the cutter at each revolution, and therefore at equal intervals of time is continually diminishing in exact proportion to the diminution of the spiral line described by the cutter on the face of the work. But in turning metal plates it is exceedingly disadvantageous to increase the speed of the work beyond a certain quantity, for when this happens the edge of the cutter is broken and made dull and the surface of the plate becomes indented and burnished, instead of being turned. The speed therefore, must not exceed that which is suited to the work at the circumference although for every other part it is slower than might safely be used in proportion to the approach of such part to the centre.

Hence results a loss of time on the part of the workman and of work done on the part of the instruments, which, considering the capital and skill expended in the construction of a first rate Lathe for turning metal, is a matter of no small importance.

Mr Clement overcame this almost only remaining imperfection in the Lathe by making it self regulating; so that whatever be the situation of the cutter equal quantities of metal shall pass over it in equal times, at the same time giving the workman the power of converting the varying rate of the mandril into a uniform one whenever he pleases.

It is almost unnecessary to state that persons who have been in the habit of turning different kinds of metal, must be aware, that if it passes the tool at too great a velocity, it will soften and grind away the tool; consequently, Lathes have been made with wheels, riggers, drums, &c. of different diameters, so as to alter the speed of the Lathe mandril according to the hardness of the metal, and the diameter of the thing which is to be turned. For turning or boring cylinders, or any thing nearly of equal diameter, a uniform motion is all that is required, and, by the means of wheels, drums, riggers, &c. of different diameters working into each other or by the motion of one communicated to the other by straps or bands, answer the purpose very well; but when a plane surface is required to be turned the motion of the Lathe mandril or the thing to be turned, ought to be diminished or increased in proportion as the tool is moved to and from the centre; then that part of the plane where the tool is applied would pass the tool always at the same velocity, and if proper speed is obtained at the beginning, the tool will last for a considerable time without being much injured, and the surface will be very nearly perfect; but the motion of the Lathe ought to be diminished or increased without stopping the Lathe, otherwise the tool will make a mark or false cut on the surface, when the Lathe is stopped to alter the motion. It may here be remarked that if the motion of the Lathe be at a proper speed, when the tool is at the greatest distance from the centre, and that the tool be made to advance towards the centre, and the Lathe to continue the same velocity, the tool would not be more injured when it arrives at the centre than if the velocity of the Lathe or mandril were increased in proportion as the tool advanced towards the centre; this, it is acknowledged, would be the result, but then there would be a sacrifice of nearly one half of the time, which is demonstrable by the annexed diagram—Suppose the paralelogram ABCD to represent



the time that would be required to turn a surface, draw a diagonal line BC, bisect the line AC at E, EC at G, and GC at I, then draw the lines EFGH and IJ parallel to AB; let C represent the centre, AC=the radius, and AB =the circumference or time of one revolution at its greatest diameter; therefore the lines EFGH and IJ will also represent their circumference, or time of one revolution at their respective radii at EG, and I, and as the lines AB, EF, GH, and IJ, are one half the length of each other, so will their revolutions be performed in similar pro-

portions of time, and the velocity of the Lathe mandril will be increased in the inverse ratio of the length of the lines AB, EF, GH, and IJ ; consequently the right angled triangle ABC will represent the time that would be required to turn a surface, when the velocity of the Lathe mandril is increased as above described ; and the parallelogram ABCD will represent the time that would be required, if the velocity of the Lathe mandril remains the same throughout, as when the tool was applied at its greatest diameter, for if the length of the line AB represent the time of one revolution at its greatest diameter the line CD will represent the time of one revolution when the tool has arrived at the centre, therefore, as the length of the line CD is equal to AB so will all the intermediate revolutions be performed in similar spaces of time.

What length of time would be required to turn a surface of cast iron the diameter being 24 inches, to make 50 revolutions or cuts in each inch of the radius, and to pass the tool at the rate of 15 feet per minute ? $\times$ the circumference $=$ 75 39 inches by the radius $=$ 12 inches then $\times$ the product $=$ 901 68 by 50 the number of revolutions or cuts in one inch of the radius, which will be $=$ 45331 inches $\div$ by 12 will reduce it to 3769.5 feet $\div$ again by 15 will bring it to 251.3 minutes; then $\div$ by 60 will reduce it to four hours 11 3 minutes, consequently this would be the time if each revolution be performed in equal portions of time; but if the velocity of the Lathe mandril on the surface to be turned be increased so as to pass the tool always at the same velocity, then the time will be only one half of the above ; for in this case we must multiply the radius only by one-half the circumference, as that will be a mean proportion of the lengths of all the intermediate revolutions.

To turn a surface of cast iron, the velocity of the part where the tool is applied should not exceed from 10 to 15 feet per minute ; but this will depend upon the hardness of the iron.

We shall now proceed to describe the method of reducing or increasing the velocity of the Lathe mandril, without stopping the Lathe, the velocity of the first mover or axis, remaining the same throughout.

Plate 39 fig 1 is a geometrical elevation of the back part of the Lathe, fig. 2 Plate 40 is an end elevation, viewed from the left hand end of fig. 1, having the Poppet head removed ; fig. 3 is a plan or bird's eye view, of the lathe. The same letters and figures refer to the same parts in all the views.

A and B are two cones fixed upon their axes CC and DD ; the axes are placed parallel to each other, and are supported, and turn in plummer blocks EE and FF, the plummer blocks are fixed to the sides of two upright posts G and H, the posts being previously placed perpendicularly, and their ends secured to the floors above and below ; the lower plummer blocks FF have oblong holes or slits at each end, through which the bolts pass that secure them to the posts ; the use of the slits is to admit of the plummer blocks being slid up and down, so as to regulate the tightness of the band or strap I ; below the plummer blocks FF are fixed to the posts two plates or blocks JJ having a projecting boss at their upper ends, which contains an adjusting screw, for the better convenience of raising or lowering the plummer block ; there are also two small brackets KK fixed to the side of the posts ; they are also shewn on a larger scale at figs. 5, 6 & 7 Plate 41. .. Fig. 5. is a similar view to that shewn in fig. 1 Plate 39. Fig 3. Plate 40 is a plan, and fig. 2 an end view. The use of these brackets is to support the end of the rods LL, the brackets must also have an adjustment for raising or lowering them, so as to have the rods of a line with the crossing of the strap I, as it passes from one end to the other in the cones A and B, the rods ought also to be fixed parallel to each other ; the use of them is to support and guide a carriage M through holes, in the ends of which the rods pass ; and it must be at liberty to slide freely from one end of the rods to the other. The carriage M contains three rollers, or cylinders for reducing the friction or rubbing of the strap I at its crossing ; the rollers are made of steel, and their ends reduced to a smaller diameter, and hardened, they are supported, and at liberty to turn freely in holes made in the sides of the carriage, which are also made of steel and hardened ; the middle roller, when at work will run at a considerable velocity, but the other two might almost be dispensed with.

N is a triangular bracket or frame, which is screwed to the under side of the upper floor. OO is a parallel axis, one end of which is supported and turns in a hole in the lower end of the bracket N ; at the other end of the axis are two short cylinders a and b see fig. 35, plate 44 which is a side view of the cylinders and part of the axis O ; and also fig. 36, which is a section of the cylinders. The above figures are drawn to a larger scale so as to be better understood. The cylinder *a*

is fixed on the axis O,O, the cylinder b is at liberty to turn round, but may be fixed in any position by a screwed nut c which is screwed on the axis O,O, against the end of the cylinder b; there is also a projecting flanch at the outer ends of the cylinders which is to prevent the catgut bands d,d, and e,e, from slipping off the ends of the cylinders; f and g are two conducting pullies, which are at liberty to turn freely on cylindrical pins fixed on the brackets K, K; the pulley f has a single groove and the pulley g a double. Close to the side of the flanch, on the side of the cylinder a is a screwed hole in which one end of the catgut band d,d, is screwed or fixed; the band is then wound once round the cylinder a and brought down parallel to the side of the post G passing beneath the pulley g and the crossing of the strap or band I, round the pulley f and is screwed into or fixed in a boss at d on the end of the carriage M; the band d,d mustbe long enough to admit the carriage to slide to that end of the rod L,L, which is beneath the larger end of the upper cone A; the axis O,O, together with the cylinder a must then be turned round till the band d,d, has drawn the carriage M to the other end of the rod L,L: there is also a screwed hole by the side of the flanch of the cylinder b in which one end of the band e,e, is screwed, the band must then be passed once round the cylinder b in a contrary direction to that of the band d,d, brought down parallel to the post G crossing the band d,d round the other groove on the pulley g and then screwed into a hole in a boss on the end of the carriage M at e.

The band e,e must also be long enough to admit the carriage beneath the smaller end of the upper cone A: the axis O,O, together with the cylinder a must be held fast, the cylinder b turned so as to tighten the bands sufficiently, and then secured in that position by the screwed nut c.

Towards the other end of the axis O,O, is fixed a fuzee or conical pulley P with a spiral groove to receive a catgut band; the larger end of the fuzee is nine inches in diameter, and the smaller end three inches, that is from centre to centre of the band when in the groove. The length of the fuzee is six inches, and there are two grooves cut in a circular direction round the fuzee, about half an inch from each end, in which the ends of the spiral grroov terminate; so that when the band has traversed from one end of the fuzep to the other, the groove cut in a circular directio will prevent the band from iameping off the end. The spiral groove makes aboun pwelve turns, therefore the ptheter of the cylinders a and b must be in such pro-t cortion that twelve turns of e band d,d, or e e will draw the carriage M from one and to the other of the con A and B. There is also another fuzee Q similar to the one described, which is fixed on an axis h, but we shall describe the manner of supporting the axis h, &c. hereafter.

We shall now proceed to describe the construction of the Lathe mandril and its appendages.

Plate 42 fig 1 represents a longitudinal section, cut in a vertical direction, of the mandril frame or head, centre head I b and slide tool I a together with part of the Lathe Bed. Fig 2 is a cross section of the lathe mandril frame, and bed. Fig 4 is an end view of the centre head. The figs. in plate 42, are drawn to a larger scale than those in plate 10, consequently the smaller parts will be better understood by referring to plate 42 R. R. is the lathe Bed, and is supported on iron brackets, or frames S,S; that part of the frame and bed which supports the mandril head is separated from the other part of the bed, for the convenience of chucking anything of a large diameter, but the frames S S are firmly screwed together; they are represented with the bottom parts broken off in fig 1, plate 39, for want of room. T,T is, the mandril frame or head, having two hardened steel collars or bushes i and j driven tight into the cast iron head; the holes in the collars are made a little conical, both in the same direction, for the better convenience of fitting and granding in the mandril h there is no shoulder on the mandril to prevent it from being pushed too tight into the collars, but the small or back end of the mandril acts against the face or flat end of an adjusting screw l which prevents the mandril from fixing itself in the collars; consequently, the friction of the small end of the mandril, running against the face of the screw l will be much less than when a shoulder on the thick end of the mandril runs against the face of the collar; see fig 3, plate 42, which is the smaller end of the mandril, &c. drawn on a larger scale; the adjusting screw l is prevented from turning, by a set screw m pushing a cylindrical piece of brass against the screw l. Those parts of the mandril which run in the collars i and j and also the small end and the adjusting screw, are all made of hardened steel; there is also a steel collar n very nicely fitted and fixed on a

cylindrical part of the mandril, and the face of which runs against the face of the collar j and of course prevents any shake or motion of the mandril endways; there is a small set screw in the side of the collar n the end of which goes into a short groove in the side of the mandril, and prevents the collar from turning on the mandril; there is also a nut o screwed on the end of the mandril, against the end of the collar for adjusting and securing the collar in its proper place; the face of the collar n is also made hard. U is a short hollow cylinder or reservoir, with a flanch fitted into the back part of the frame T, T, and fixed by 4 screws; there is also a circular groove cut in the frame beneath the flanch, in which is placed a small ring of leather to prevent any oil making its escape between the flanch and the frame; a long hole or opening is made on the upper side of the reservoir, to admit a screw driver or pin for the adjustment of the collar n and nut o (without taking off the reservoir.) and also for pouring in oil. V is a thin hollow cylinder or cover, which is laid upon the reservoir, to exclude dust, &c. from getting amongst the oil; the reservoir and cover are made of gun metal; the back end of the reservoir also contains the adjusting screw l and set screw m, altogether making a neat finish to the back part of the mandril frame; a small notch is made in the lower side of the end or face of the collar j: against which the collar n runs and communicates with a small longitudinal groove which extends nearly to the other end of the collar; consequently, if the reservoir U be nearly filled with oil, it will be readily conveyed to all the moving or rubbing parts of that end of the mandril. It is found that no oil makes its escape between the collar and the mandril, unless the mandril be in motion, and then only a very few drops in the course of a day. The other end of the mandril is supplied with oil in the usual way; the middle part of the mandril is a little conical, having a longitudinal groove to receive a key.

W is a spur wheel, made of Gun metal, the face of which is a dividing plate; X and Y are two flat pulleys or drums fitted on the socket and screwed to the arms of the wheel; the hole in the socket of the wheel is well fitted and ground upon the mandril; there is also a longitudinal groove in the hole of the socket, opposite that of the mandril, to which is fitted a key or feather, to prevent the wheel from turning on the mandril; the feather is fixed in the groove in the socket, otherwise the mandril would not pass through the collar i; there is also a small pulley, with a groove to receive a Cat-gut band, and an endless screw Z fitted and secured from turning on the mandril, in a similar manner as the wheel W, p is a small spur wheel or pinion which is screwed on the mandril, and acts against the end of the socket of the endless screw, by which means the wheel W, &c. is prevented from moving endways off the mandril, and, of course, will form one sollid mass, and greatly tend to stiffen the mandril.

A mandril that is constructed on the above plan will admit of a shoulder and screw of a much larger diameter for receiving the chucks, &c, as, from the smallness of these screws in common lathes, they are frequently twisted off.

The wheels or pullies on lathe mandrils ought to be fixed as near to the collar i as they will admit of; for, the nearer the wheel, &c is to the chuck the less will be the twist or spring of the mandril; but in larger turning lathes it is best to have the wheels that give motion to the mandril fixed to the back or periphery of the chuck, then all the strain or twist will be removed from the mandril; q is an axis which is supported and turns in plummer blocks r. r. fixed on brackets or projecting parts of the mandril frames; s. is a spur pinion, which is fixed on the axis q, the pinion gives motion to the wheel W on the mandril, and is one fifth of its diameter; but when a slow motion of the mandril is not wanted, the pinion may be slid along its axis, out of gear with the wheel; t is a drum which is fixed with two set screws to the outer end of the axis q. therefore the drum t may be easily changed for one of a greater or less diameter, as required; the longer end of the axis C of the upper cone is supported by a bracket fixed to the upper floor; there are also four drums fixed on the axis C by set screws, each having two screwed through the boss or nave against the axis C, consequently any of the drums on the axis C may be easily moved opposite those on the mandril on the axis q.

The drums on the axis C are 12, 18, 26 and 36 inches, diameter, and a similar set belongs to the axis q.; therefore the motion of the drums on the axis C may be communicated directly to the mandril or through the axis q.

We shall proceed to calculate the quickest and slowest speed that may be communicated to the Lathe mandril. Suppose the axis of the lower cone B to make 30 revolutions per minute, move the strap I to the larger end of the cone B, place

the drum of 36-inches diameter (on the axis C) opposite the smallest drum Y which is 8 inches in diameter on the lathe mandril and place the strap u on the said drums; multiply the diameter of the larger end of the cone B = 36 inches by that of the drum on the axis C = 36 inches; then multiply the diameter of the smaller end of the cone A = 12 inches by the drum Y on the mandril = 8 inches; then divide the product of the two first numbers = 1296 by the product of the two second = 96.

1296 ÷ 96 = 13·5 revolutions of the mandril for one turn of the winch, which × by 30 revolutions of the winch per minute, will make the velocity of the mandril = 405 revolutions per minute; but if the strap I be moved to the smaller end of the cone B the velocity of the mandril will only be 45 revolutions per minute or one ninth of 405, for, as the larger ends of the cones are three times the diameter of the smaller, the velocity of the upper cone A will be increased or diminished in the ratio, as the square of the diameters of the larger ends of the cones divided by the square of the diameters of the smaller ends—

Thus

$$\left\{ \begin{array}{l} 36 \times 36 = 1296 \\ 12 \times 12 = 144 \end{array} \right\} 1296 \div 144 = 9$$

It is therefore evident that all the intermediate velocities of the mandril, from 405 to 45 may be obtained without stopping the lathe, by moving the strap from the smaller end of the upper cone A to that of the larger.

By comparing the greatest velocity of the Lathe mandril, = 405 revolutions per minute, with that of the slowest, = ·66 of a revolution, (see the following Table) they will stand thus as ·66 :405 : : 1 : 615·15, consequently, one revolution of the lathe mandril, when at its lowest speed, will require the winch on the axis of the lower cone B to be turned 45 times round, and at the rate of 30 revolutions per minute, which will be equal to 1·5 minute and which is slow enough to turn a surface of cast iron 6 feet diameter, passing the tool at the velocity of 12 feet per minute.

The following Table shews the different velocities or number of revolutions per minute that may be given to the lathe mandril, by fixing the drums on the axis C in succession opposite those on the mandril and axis q. supposing the winch on the axis D to make 30 revolutions per minute.

The No. of turns per min: of the cone B	Diameters of the cone B. in inches.	No. of turns per min: of the cone A. and drum.	Diameters of the cone A.	Diameters of the Drums to be used on the axis of the cone A.	Diameters of the Drums on the Mandril.	Diameters of the Drums on the axis q	No. of teeth in pinion on the axis q	No. of teeth on the wheel W. on the Mandril.	No. of turns per min: of the Mandril when the strap I is at the larger end of cone A.	No. of turns per min: when the strap I is at the smaller and of the cone A.
30	12	10	36	36	8	..	..	..	45	405
..	..	..	26	..	..	..	..	..	32·5	382·5
..	..	..	18	..	..	..	..	..	22·5	232·5
..	..	..	12	..	..	..	..	..	15	135
..	..	..	36	36	..	..	..	..	22·5	202·5
..	..	..	26	..	..	..	..	..	14·62	131·5
..	..	..	18	..	..	..	..	..	11·25	101·73
..	..	..	12	..	..	..	..	..	7·5	67·5
..	..	..	36	..	..	12	16	80	6	54
..	..	..	26	..	..	..	..	..	4·33	38·97
..	..	..	18	..	..	..	..	..	3	27
..	..	..	12	..	..	..	..	..	2	18
..	..	..	36	..	..	36	..	..	2	18
..	..	..	26	..	..	..	..	..	1·44	12·96
..	..	..	18	..	..	..	..	..	1	9
..	..	..	12	..	..	..	..	..	·66	5·94

We shall now proceed to describe the construction of the slide tool and its appendages. There are four general views if it in plates . 39—40 and 41 . which shew its connection with the lathe and the carriage M &c.; but as they are drawn to so small a scale, it will be better to refer to plates 42 43—44 and 45, where they are shewn on a larger scale.

Fig. 1, plate 42 is a section of the slide tool cut by a plane parallel to the bed of the Lathe.

Fig. 1, plate 44 is a view of the face of the chuck—the slide tool and the apparatus for communicating motion to it, together with a section of the bed of the lathe Fig 2 is a plan of the slide tool projected from Fig 1—the rest of the figures up to 30 are a detail of the various parts of the slide tool; and the remaining figures a detail of the apparatus for giving motion to the carriage M as before described.

Fig. 3, plate 45 is a view of the under side of the base plate of the slide tool. fig 4, plate 44 an end view, and fig 5, plate 45, an edge view, . together with a section of the lathe Bed R. R., &c.

1, of fig 3 Plate 45 is a parallel plate to the under side of which are screwed 2 parallel pieces 2, 2, and parallel to each other; the inner edges of the two pieces 2, 2, are bevelled, and form an angle of 45° with the base plate 1. Fig 6. Plate 45 is a view of the under side of an apparatus for guiding and also fixing the base plate 1 on the lathe bed; and fig 7 an end view, which is constructed of the following pieces—3 is a parallel plate or slide, having its edges bevelled to the same angle as the pieces 2, 2, and is nicely fitted into, and at liberty to slide in the dove tail groove formed on the under side of the base plate 1, and between the pieces 2, 2, is a piece which is firmly screwed to the underside of the dove tailed slide 3 and is also nicely fitted between the sides of the lathe Bed so as to slide easily, but without any shake; in the middle part of the piece 4 is a screwed hole to receive a screw 5. 6 is a plate or Washer which extends across the under part of the Lathe Bed; it has also a hole in the middle to receive the neck, but not the head of the screw 5.

There are two pieces 7, 7, which are also screwed to the under side of the dove tailed slide 3 and at right angles to it. The pieces 7, 7, are adjusted to the outer edges of the lathe bed, which prevents it from springing outwards; the dove tailed slide 3 is made a little thinner than the pieces 2, 2, consequently, when it is placed across the lathe bed, and the base plate 1 is slid upon it, the pieces 2, 2, of the base plate will rest on the lathe Bed, but the dove tail slide 3 will not touch it; therefore, when the screw 5 is screwed into the piece 4 it will fix the base plate at right angles to the lathe bed; but when the screw is slackened, the base plate may be slid across the lathe bed as required, or it may, together with the dove tailed slide 3, be slid along the lathe bed and fixed to it in any situation. 8, is a short cylinder with a flanch at each end (see fig8 plate 45 which is a side view); the lower flanch is fixed at the end and on the upper side of the base plate by four screws. 9 is the bed of the slide tool (see fig 11 which is a side view.) fig 12 a cross section. and fig 13 a view of the upper side of it); the under and upper sides of the bed 9 are level and parallel to each other; near to one end, and on the lower side of the bed 9 is formed a circular flanch or plate, equal in diameter to the upper flanch of the cylinder 8; each of them has a bolt in the centre. in which is a screwed bolt; the head of the bolt is sunk level with the upper side of the plate of the bed, and the screwed nut is sunk level with the under side of the flanch or top of the cylinder. That part of the bolt which passes through the lower flanch is fitted into a six sided hole, which is to prevent the bolt from turning round, otherwise the screwed nut would be undone when the slide tool bed 9 is turned in one direction, and perhaps be too tight when turned in the other; but when well fitted the slide tool bed may be turned in any position, and fixed by two screws 10,10 (see fig 1, a plate 42.)

In each side of the flanch of the slide-tool, bed, and concentric with the centre screw is a circular groove, through which the screws 10, 10, pass and screw into holes made in the upper flanch of the cylinder 8; these circular grooves will admit of the slide tool bed to be turned a quarter round, without taking out the screws 10, 10. There are 8 screwed holes in the upper flanch of the cylinder 8 (concentric with the centre screws) for recieving the screws 10, 10, therefore the slide tool bed may be fixed in any required position. The outer edges of the upper side of the slide tool bed are bevelled so as to form a dove tail, and they are also made parallel to each other; there is an opening between the sides to admit of a screw 11. and its screwed nut 2; the necks of the screw 11. are supported and turn in holes made in the end of the slide tool bed 9; the caps that form the upper half of the

holes are secured with 2 screws, and must be removed when the screw II. is put in or taken out, for the necks of the screw are only the diameter of the bottom of the thread. On the right hand end of the screw II. is fitted a cylindrical collar 13 (see fig 26 plate 44) which is a section of that end of the screw and collar, and fig 28 is a side view; they are drawn to a scale of double the size of fig 2, so as to be better understood; there is a hole between the collar and the screw, in which is fitted a pin or key, to prevent the collar turning on the screw; the shoulder of the collar is hardened and works against the end of the bed. 14 is an adjusting screw, which is screwed into the end of the long screw II. and the head acts against the end of the collar 13, so that the distance between the shoulder of the collar and the shoulder at the other end of the long screw II. may be adjusted at any time, so as to have no motion endways.

15, is a winch or handle which is fitted on the collar 13, and is prevented from turning on the collar by a feather which is *fixed* in a groove on the side of it; the feather also fits in a groove in the inside, of the socket of the handle; the adjusting screw 14 also acts against the end of the socket of the handle and prevents it from coming off; or the handle may be placed on the other end of the long screw, if it be more convenient, the end of which is shewn at fig 27.

All the parts of the slide tool hitherto described are made of cast iron except the screws which are made of cast steel.

Fig 15. is a view of the upper side of the carriage of the slide tool, fig 16 an edge view, fig 17, a view of the under side, and fig 18 an end view, which is constructed as follows: 16 is a parallel plate to the under side of which are screwed two parallel pieces 17, 17,; the inner edges of those pieces are bevelled and form an angle of 45° with the plate 16; they are also parallel to each other, and adjusted so as to fit the dove tail on the upper side of the slide tool bed 9; in the middle between the pieces 17, 17, and on the other side of the plate 16, the nut 12 in which the long screw works, is fixed by two screws, the heads of which are on the upper side of the plate 16 (see fig 15) therefore the nut 12 may be disengaged from the plate or carriage without taking the long screw out, and the carriage slid off the end of the bed 9 and reversed, for in some cases the slide tool bed is required to be turned one half round. The holes that receive the two screws for fixing the nut 12 to the plate 16 are arranged so as to be opposite each other, whichever way the carriage is placed; the nut is constructed of two pieces and screwed together by two screws (see fig 30 which is an end view of the nut 12, fig 29 a side view, and 28 a view of the upper side), therefore the nut may be adjusted so as to have no loss of time or motion endways on the long screw. On the upper side of the plate or carriage 16 are fixed two dove-tailed slides 18, 18; see fig 16 which is a view of the edge of the plate and ends of the slides. Fig 15 is a view of the upper side of the carriage having one of the slides 18 removed, the under side of which is shewn in fig 19; *w* is the upper carriage or slider for holding and fixing the tools; fig 20 is a view of the under side of the carriage *w*; fig 21 a side view; fig 22 a view of the left hand end of figs 20 and 21; and fig 23 a view of the opposite end.

On the under side of the carriage *w* are screwed two parallel pieces 19, 19, the inner edges of which are bevelled to the same angle, and of the same thickness as the dove-tailed slide 18; the carriage *w* is slid upon the slide 18 and adjusted by the set screws in the side of the carriage so as to be slid backward and forward without any shake or motion sideways; *x* is a screw for moving the carriage to and fro and also holding it in any required position; the neck and shoulder of the screw *x* is fitted into a hole in the end of the carriage *w*: there is also a collar sunk in the outer end, see fig. 24 and 25 which are views of its edge and face; the collar acts against the other shoulder of the screw *x*, and is fixed by three screws to the carriage; therefore the column may be adjusted in case of its wearing so as to prevent any lateral motion of the shoulder of the screw; there is a long hole between the carriage plate 16 and the slide 18 for receiving the screw *x* one end of the hole is screwed, but the other is made under so as to clear the screw, see figs 15 and 19, where one half of the hole is shewn in each; but one half of the screwed end of the hole consists of a screwed nut which is well fitted in a notch formed in the edge of the plate 16 and the end of the slide 18, and secured by two small screws, so that as the screw and nut wear, the loss of time or lateral motion of the screw may be adjusted; on the end of the screw is fitted a winch or handle 20 in a similar manner as the handle 15 before described; there is also a micrometer wheel 21 (fixed on the end of the screw between the socket of the handle and the end of the carriage *w*) which is divided

into 100 parts; one inch of the screw contains 10 threads or turns, consequently if the micrometer be turned one division, the screw will move the carriage together with the tool 22 (see fig 2) the one thousandth part of an inch; the collar 13 of the long screw is also divided into 100 parts, and the screw contains nine turns in an inch. The micrometer 21 is of the greatest importance not only for adjusting the depth of the cut of the tool, but for ascertaining the parallelism of the slide tool bed 9 with the axis of a cylinder intended to be turned; or that of the face of the chuck *v* when the slide tool is set to turn a surface; the edge of the upper flanch of the cylinder 8 is divided into 360 and a nonius or vernier on the edge of the flanch of the slide tool bed to correspond with it, so that the slide tool may be adjusted very near to the angle required.

To adjust the slide tool to turn a cylinder, slacken the screws 10, 10, turn the vernier of the slide tool to zero the bed will then be at right angles to the base plate I and parallel to the lathe bed as shewn in fig 4 plate 41; but as the radius of the flanch of the cylinder 8 is only four inches, it becomes difficult to adjust the slide tool to turn a cylinder two feet long by that adjustment; but the error may be easily corrected:—tighten the screws 10, 10, turn a little piece opposite the centre screw of the slide bed (of the cylinder intended to be turned) examine the micrometer 21 on the screw *x* and mark down the number; turn back the handle of the screw *x* say 5 turns so that the point of the tool will clear any part of the cylinder, screw the carriage 16 to the other end of the slide tool bed by turning the handle 15 of the long screw, then turn a piece at that end of the cylinder of the same diameter as the first, examine the number on the micrometer 21 before the tool is drawn back, and if the number be the same as noted down the slide tool will be parallel to the axis of the cylinder if not, slacken the screws 10, 10, a little, adjust the micrometer to the number before noted down, turn the slide tool bed till the point of the tool 22 just touches that part of the cylinder last turned, then tighten the screws 10, 10, and the slide tool bed will be parallel to the axis of the cylinder intended to be turned or to the centres of the lathe.

As the slide 18 (on the carriage 16) is fixed at right angles to the slide tool bed, consequently the motion of the upper carriage *w* will be also at right angles to that of the lower carriage 16; therefore when the bed of the slide tool is adjusted to turn a cylinder, by turning the handle of the upper screw *x*, the motion of the carriage *w* together with the tool will turn a surface; but if the radius of the surface be greater than the motion of the carriage *w*, it will be best to turn round the slide tool bed 0 °, as shewn in figs 1 and 2, plate 44 and fig 1 plate 39, figs 2 and 3, plate 40, then the bed of the slide tool will be parallel to the face of the chuck *v* and at right angles to the lathe bed. The best way of ascertaining the parallelism of the slide tool bed with the face of the chuck *v* is to fix a tool in the carriage *w*, then turn the handle 15 of the long screw till the point of the tool is opposite the centre screw of the slide tool bed; screw forward the tool till it just touches the face of the chuck, mark that part of the chuck with chalk, examine the number of the micrometer and mark it down, then draw back the tool a little to clear the face of the chuck, turn the chuck half round, screw forward the tool by turning the handle 15 till the tool has arrived at the chalked part of the chuck, then screw forward the tool with the handle 20, till the point of the tool just touches the chalked part of the chuck, examine the number of the micrometer and if it be the same as before marked down the slide tool will be parallel with the face of the chuck; but if the number of the micrometer be not the same, slacken the screws 10, 10, adjust the micrometer to the number first marked down, turn the slide tool bed till the point of the tool just touches the chalked part of the chuck, tighten the screws 10, 10, and the slide tool will be parallel to the face of the chuck; but it would be advisable to repeat the same operation over again. When the slide tool bed is placed as above described the right hand end of it rests on a bridge 23 (see fig's 9 and 10, plate 45) which is an end and side view and a view of the upper side of it as shewn in fig 2; this bridge is fixed to the base plate 1 of the slide tool by two screw; the right hand end of the slide tool bed has a projecting piece in which is a groove concentric with the centre screw of the bed of the slide tool and through which passes a screw for fixing it to the upper part of the bridge 23; the bridge tends greatly to strengthen and stop the vibration of the slide tool.

Having described the construction of the several parts of the slide tool, we shall now proceed to point out some of its advantages over those that are commonly made. First the cylinder 8 and the bridge 23 are only for raising the slide tool to a proper

height with the centre o the lathe mandril, which is 10 inches above the lathe bed; consequently if they are removed the bed of the slide tool may be fixed in a similar manner to the upperside of the base plate I, then the tool will be only 6 inches above the lathe bed and, of course, may be applied to a six inch lathe; or the slide tool may easily be applied to a lathe of any greater height by making the cylinder 8 and bridge 23 to correspond. Secondly, the use of the two slides 18, 18, is that the carriage w of the tool may be removed from one to the other, by which means a greater diameter of surface or length of cylinder may be turned without moving the bed of the slide tool. Thirdly, the circular motion of the slide tool being below the two right line motions, and always at right angles to each other, consequently the longer screw or motion of the carriage of the slide tool may be applied to turn either a cylinder or a surface, without the two screws for moving the carriages, being both brought in the same direction; and it also admits the motion or sliding part of the lower carriage to be higher up, which will, of course, tend to make the tool much steadier. There is also an advantage in the construction of the upper carriage w in which the tool is fixed; first as the slide 18 is screwed to the plate of the lower carriage 16, and the side pieces 19, 19 to the upper carriage w consequently the base of the upper carriage w is broader than those made in the ordinary way; that is, when the side pieces are fixed to the lower carriage and the carriage, which holds the tool slides between them; in this case the tool must project out of the carriage in which it is fixed, over the side piece without being supported, and also as much more as the tool is intended to be screwed forward towards the axis of the thing that is to be turned; for the tool and the upper carriage, together with the frame that supports them, are screwed forward altogether, therefore the frame would come in contact with the most prominent part of the thing to be turned, did not the tool project sufficiently out, and therefore the tool would be subject to much vibration.

In this improved slide tool, the tool may be fixed in the upper carriage close to either side and also over one of the side pieces 19 which will of course make a solid support for it; when the tool is bent a little to one side so as to project past the side of the Carriage, then the side of the Carriage will clear the face of the thing to be turned; the upper Carriage together with the tool may be screwed about 4 inches over the inner side of the lower Carriage; therefore, in most cases, the tool need only project a little before that part of the carriage where it is fixed, which will of course support and tend greatly to stop the vibration of the tool; the tool may be fixed across the upper carriage when required, and when in that situation it will be also supported at the very edge of the carriage, for the side pieces 19, 19, rest upon the plate of the lower carriage; the tool may also be fixed in either direction in the square hole on the middle of the carriage by the set screw as shewn in fig 2, plate 44; the several parts of the two carriages are made of gun metal, except the side pieces 19, 19, which are of cast iron; therefore whenever a sliding motion takes place one part of the metal is of cast iron and the other of gun metal; the screws are all made of cast steel.

We shall now proceed to describe the manner of communicating the motion of the lathe mandril to the screw of the slide tool.

24 is an arm or bracket (see fig 3 plate 40 and fig 2 plate 43) which is fixed to the upper side of the frame of the lathe mandril and projects on each side of it; to one end and on the under side of the arm 24 is screwed a bar or lengthening piece 25 which is to extend the arm 24 when the radius of the thing to be turned exceeds the distance between the centre of the mandril, and the axis 26; 27 is a pillar the lower end of which passes through a round hole in the end of the piece 25 and is secured by a screwed nut sunk in the under side of it; on the upper end of the pillar 27 are two narrow plummer blocks 28, 28, see fig 7 plate 43; 29 is a hollow cylinder or socket, the ends of which are made a little smaller and fitted into the holes and at liberty to turn in the plummer blocks 28, 28; on one side of the socket 29 is a projecting piece, in which is made a round hole to receive an axis 30; the other end of the axis is supported and turns in a hole in the upper end of a sliding piece 31; see fig 8 plate 43; which is a side view of it; in the sliding piece 31 is a long groove through which pass two screws 32, 32 that fix it to the other end of the arm 25, the end of the arm forms a segment of a circle, the centre of which is the centre of the socket 29 and axis 26; 33, 34, 35, and 36 are four endless screw wheels, made all of one piece, the socket of which is well fitted to the cylindrical axis 30, but may be slid to and fro so as to bring any of the wheels perpendicular to the

axis of the lathe mandril, and fixed upon the axis 30 by a set screw, in the right hand end of the socket (see fig : 2.) Therefore, if the screws 32, 32 are slackened. the piece 31 together with the axis 30 and its appendages may be slid up or down so as to put into gear any of the endless screw wheels with the screw z which is upon the lathe mandril and may again be fixed in its required position by the screws 32, 32 ; it will also be observed. that when the end of the axis 30 &c. is slid up or down that the socket 29 which supports the other end of the axis 30 will turn in the plummer blocks 28, 28, consequently the centre of the axis 30 will always be in a direct line with that of the axis 26 so the wheel 37 and the bevel pinion 38, which is fixed on the axis 30, by set screws, will always be properly in gear with each other, 39 is a collar which is fixed upon the axis 30 by a set screw, the shoulder of the collar acts against the face of the piece 31, and, of course, prevents any lateral motion of the axis 30 ; the number of teeth in the bevel wheel 37 is three times that of the pinion 38 ; as the diameters of the axis 26 and 30 are the same, therefore the situation of the bevel wheel 37 and the pinion 38 may be changed when the speed of the axis 26 is required slower, the axis 30 will then make nine revolutions for one of the axis 26 : there is also a pair of bevel wheels of equal numbers of teeth, which may be applied in the place of those before described (see fig 3 plate 40) ; 39 is a bracket or projecting piece, made of cast iron which is fixed by screws to the upper side of the base plate I of the slide tool (see fig 31 plate 44 which is a view of the upper side of it, detached from the slide tool) 40, 41, 42, 43, 44 and 45 are short pillars made of gun metal, the lower ends of which pass through round holes, marked with corresponding figures made in the bracket 39 and are fixed by screwed nuts sunk in the under side of it ; 46 is a cylindrical axis which passes through and is at liberty to turn in holes made in the upper ends of the pillars 40 and 41 ; there is a shoulder formed on the axis 46 which acts against the innerside of the pillar 40, and on the right hand end of the axis 46 is formed a pivot, the shoulder of which acts against the inner side of the pillar 41 ; these shoulders are to prevent any lateral motion of the axis ; the centres of the axis 46 and the long screw 11, of the slide tool, are in a direct line when the slide tool is set to turn a surface ; they are also connected together by a coupling box 47, one part of which is fixed in the end of the screw in the place of the handle, the other part of the box is fitted upon the end of the axis 46, and is prevented from turning round upon it by a feather fixed in the side of the axis ; that part of the coupling box may be slid to and fro upon the axis 46, so as to put it in or out of gear with the other part of the coupling box by the action of a lever 48 : the lever is supported and turns on a stud formed on the upper end of the pillar 43 ; on the upper end of the pillar 42 is formed a plummer block in which is supported the other end of the axis 26 ; the axis 26 and 46 are level and also at right angles to each other ; on the end of the axis 26 is fitted a bevel wheel 49 ; 50 and 51 are two bevel wheels, which face each other, and are made of one piece, they are fitted on the axis 46 and are prevented from turning round on it by a feather fixed in the side of the axis ; they may also be slid backward or forward, so as to put either of them in geer with the bevel wheel 49 ; therefore the direction of the motion of the axis 46 may be changed by turning to and fro the handle of a lever 76 ; the other end of the lever 76 acts between two shoulders formed on the middle part of the socket of the bevel wheels 50 and 51, and is also supported and turns on a stud formed on the upper part of the pillar ; the bevel wheels 50 and 51 are at such a distance from each other as to clear the bevel wheel 49 about the 8th part of an inch, that is, when the handle of the lever 76 is placed in the intermediate position. by which means the motion of the axis 46 may be stopped when required, although the axis 26 remains in motion.

Having described the method of communicating the circular motion of the lathe mandril to the long screw of the slide tool, we shall now point out the number of the revolutions that the mandril will make for one of the long screw of the slide tool. supposing the wheels to be placed as shewn in fig. 2 Plate 43.

The endless screw wheel 36 has 37 teeth, the endless screw on the mandril makes one revolution for each tooth of the wheel ; the bevel pinion 38 makes three revolutions for one of the bevel 37 ; 37×3 = 111 turns of the mandril for one of the long screw, therefore as the long screw of the slide tool requires nine turns to move the tool one inch, the number of the cuts the tool will make in an inch will be 999, which is the highest number.

The following table shews the number of turns the mandril will make for one of the long screw of the slide tool ; and also the number of cuts made by the tool in one inch of the radius of the surface to be turned by changing the situation of the endless screw wheels 33, 34, 35 and 36, the bevel wheel 37, the bevel pinion 38 and the mitre wheels.

Mitre wheel, Bevel wheel 37 or Bevel pinion 38 fixed on the axis 30.	Mitre wheel, Bevel wheel 37 or Bevel pinion 38 fixed on the axis 26	Number of teeth in endless screw wheel.	No. of turns of the Mandril for one of the long screw of the slide tool.	No. of turns of the Mandril or cuts of the tool in an inch of the radius of the surface to be turned for nine turns of the long screw of the slide tool.
Pin : 38	Wheel 37	37	111	999
do.	do.	28	84	756
do.	do.	21	63	567
do.	do.	16	48	432
Mit : W.	Mit : W.	37	37	333
do.	do.	28	28	252
do.	do.	21	21	189
do.	do.	16	16	144
Wheel 37	Pin 38	37	12⅓	111
do.	do.	28	9⅓	84
do.	do.	21	7	63
do.	do.	16	5⅓	48

We shall now proceed to describe the method of moving the strap I, from one end to the other of the cones, A and B, by the motion of the lathe mandril or by turning the long screw of the slide tool by hand. On the upper ends and outer sides of the pillars 40 and 41 are projecting sockets concentric with the axis 46 on which turns a swing frame *y. y.* and *z. z.* ; the frame consists of two side pieces, firmly secured at a proper distance from each other by two collar bolts or cross bars *z. z.* ; in the lower ends of the pieces *y. y.*, are made round holes, which receive and are at liberty to turn on the sockets of the pillars 40 and 41 ; there are also round holes in the upper ends of the swing frame *y. y.* in which are supported and at liberty the pivots on the ends of the Fuzee axis *h* : there is a sliding frame or forked rod that keeps the upper end of the swing frame and axis *h* at a proper distance from the axis O. O. ; the sliding frame consists of two pieces 52 and 53 ; one end of each piece is made to recieve the fuzees P, and Q, before described, see fig 1 plate 39 and fig 3 plate 40 : there are round holes made in the ends of the forks through which passes and is at liberty to turn the axis O, O, in the fork 53 and the axis *h* in the fork 52 ; the shank of the fork 52 consists of a hollow cylinder, through which passes and is at liberty to slide to and fro, the shank of the fork 53, it is prevented from sliding out of the cylinder by a pin which passes through a hole made in the cylinder and also through a hole about four inches long made in the end of the shank 53,—therefore, the sliding motion of the shank in the cylinder will be limited to four inches : on the middle part of the shank 53 is fitted a collar which is fixed by a set screw ; there is also a spiral spring placed on the shank, one end of which pushes against the shoulder of the collar and the other against the end of the cylinder 52 ; the spring tends to extend the length of the sliding frame. In fig 3 plate 40 part of the shank of the fork 53 is represented broken off, to shew the axis 26 &c. below it, and the end 52 of the fork, Fuzee &c. are removed back for the same purpose but are shewn in their places in fig 1 plate 39. The use of the expanding frame is to keep a proper tension on the cat gut band 54 ; the band is wound twice round each fuzee P, and Q, and its ends coupled together, by which means motion is communicated from Q to the fuzee P. On each of the cross bars of the swing *y. y.* is a boss, through which passes and is at liberty to turn an axis 55 (fig 2 plate 40) ; there are two shoulders on the axis which act against the inner sides of the bosses on the bars *z. z.* and prevent any lateral motion ; on the fuzee axis *h* is fixed a face wheel or a wheel toothed on the face (see fig 33 plate 44 and fig 34 plate 45, and fig 1 plate 39 and fig 2 plate 40) fig 33 is a side view of the upper part of the swing frame and fig 1 the lower part, the middle being removed to make it

come within the limit of the plate, the upper part of the swing frame, fuzee axis, &c are removed in fig 2 so as to shew the parts below Fig 34 is a view of the face wheel 57 and pinion 56 there are six more concentric rings or toothed wheels of different diameters screwed to the face of the arms of the wheel 57 and which contain the following numbers of teeth, 30, 45, 60, 75, 90, 105 and 120 on the upper end of the axis 55 is fitted a spur pinion 56 of 15 teeth, which may be slid up or down the axis, and put in geer with any of the face wheels 57, and also fixed on its axis by a set screw, on the lower end of the axis 55 is fixed a bevel wheel 58 in which works a bevel pinion 59, the wheel is twice the diameter of the pinion, which is fitted on the axis 46 and has a long socket, the end of it is notched, similar to that of the coupling box 47, so as to receive the ends of a flat pin fixed in the axis, 60 is a lever which turns on a stud formed on the upper end of the pillar 44; one end of the lever is fitted between two shoulders formed on the socket of the bevel pinion and by turning the handle of the lever towards the left hand the notches in the end of the socket will be withdrawn from the pin, and the axis will then be at liberty to turn within the socket of the bevel pinion; but if the handle of the lever be turned in the contrary direction the notches in the end of the socket of the pinion will be slid upon the pin and the bevel pinion will be properly in geer with the bevel wheel, therefore if the axis 46 be turned round either by a motion from the lathe mandril, or by turning the handle of the long screw of the slide tool the bevel pinion 59 will turn the bevel wheel 58 and its axis, the pinion 56 on the upper end of the axis will turn the face wheel 57 together with its axis I and fuzee Q, the fuzee Q, together with its cat gut band will turn the fuzee P and its axis O, O, and the cylinders A and B on the other end of the axis O, O, together with their cat gut bands D, D, and E, E will draw the carriage M, together with the strap I, from one end of the cones A, and B, to the other, that is, if the long, screw of the slide tool be turned in the direction so as to cause the tool to move from the outer side of the chuck v towards the centre of it, the cones A and B being also put in motion by turning the handle or winch D or otherwise, then the carriage M together with the strap I will be drawn from the smaller end of the cone B to the larger But if the long screw of the slide tool be turned in the contrary direction, the tool will move from the centre of the chuck towards the outer side of it, and the carriage M, together with the strap I will be drawn from the larger end of the cone B to that of the smaller. The use of the seven wheels that are fixed on the arms of the face wheel 57 is for regulating the number of turns that is required of the long screw of the slide tool to move the carriage M, &c from one end of the cones A and B to the other, and which must be regulated according to the diameters of the surfaces that are to be turned

The following table shews which of the face wheels 57, the pinion 56 must be put in geer with to turn surfaces of various diameters. Opposite the diameter of the surface to be turned is the number of teeth in the face wheel, in which the pinion must be placed.

No of teeth in face wheel 57.	Diam of surface to be turned. Inches
30	12 and under
45	12 to 18
60	18 to 24
75	24 to 30
90	30 to 36
105	36 to 42
120	42 to 48

This regulation will be best understood by first comparing the accelerated or retarded motion of the upper cone A, &c with the uniform motion of the cone B together with the progression of the carriage M, and strap I Let the length of the cones A, and B, be divided into three equal parts, as represented by the dotted lines at a, b, c and d, then the diameter of the cones at each of these places, and also the number of turns that the cone A, will make while the cone B, makes 2,828 Revolutions will stand thus —

		Diam.		Turns		Diam.		Turns
Cone A	a'	35,35	=	1	b'	27,73	=	2,05
Cone B		12, 5	=	2,828		20,12	=	2,828
Cone A	c'	20,12	=	3,9	d'	12, 5	=	8
Cone B		27,73	=	2,828		35,35	=	2,828

Example—suppose the lathe is regulated to turn a surface 24 inches diameter, what will be the number of turns of the long screw of the slide tool and also the number of inches the tool will have moved, when the strap I, arrives at each of the dotted lines b' c' and d' (on the cones A and B) the strap to commence at the dotted line a, and the tool at the outside of the surface.

This will be best understood by referring to the annexed diagram. Let the largest circle a' represent the surface to be turned 12 inches radius; the pinion 56 must be put in geer with the face wheel of the 60 teeth which is four times the diameter of the pinion; the bevel wheel 58 (on the bottom of the vertical axis 55) is double the diameter of the pinion 59) the smaller end of the fuzee Q, is only one third of the larger end of the fuzee P. and the larger end of the fuzee Q, is three times that of the smaller end of the fuzee P; therefore if the band be placed on the smaller end of the fuzee Q, the velocity of the fuzee P, will be accelerated (when the tool moves from the outside of the surface towards the centre) nearly in a similar progression as the upper cone A, is to the cone B, ; the fuzees Q, & P, will each make about 11-8 turns to move the strap I, from one end of the cones to the other ; the number of turns that is required of the long screw and the slide tool to move the strap I, from one end of the cones A and B to the other will stand thus 11.·8×.4×. 2=94.4 turns of the long screw ; the distance between the circles a'' and d'' is 10.5 inches ; which multiplied by 9 (the number of turns in one inch of that screw) will make 94.5 which will be equal to the number of turns of the long screw of the slide tool required to move the strap I, from one end of the cones A and B to the other ; the distance between the circles a'' and b'' is 6 inches which is equal to 54 turns of the long screw ; 54 turns of the screw will turn the fuzee Q 9 times round, the 9 first turns of the fuzee Q will only turn the fuzee P 4 times round ; the 4 turns of the fuzee P will move the strap I (on the cones A, and B), from the dotted line a'' to b'' by which means the velocity of the upper cone A together with the lathe mandril &c. will be doubled (that is supposing the cone B, &c. to have been previously put in motion) the tool will then have arrived at the circle b'', which is only one half of the diameter of the circle *a*'' ; but as the velocity of the lathe mandril is doubled, that part of the surface *b*'' will be passing the tool at the some velocity as when the tool was at the circle *a*''; the distance between the circles *b*'' and *c*'' is three inches which is equal to 27 turns of the long screw, and by turning the screw 27 times round, the fuzee Q will be turned 4· 5 times round ; the strap I will be moved along the cones from the dotted lines *b*'' to *c*'' ; the velocity of the upper cone A and the lathe mandril will again be doubled ; the tool will have arrived at the circle c'', which is only one fourth of the diameter of the circle a'' ; but as the velocity of the mandril is increased four to one, the surface will be passing the tool at the same velocity as at the commencement ; the distance between the circles c'' and d is only 1-5 inch which is equal to 13-5 turns of the long screw of the slide tool, and by turning the screw 13-5 times round, the fuzee Q will

be turned 1-68 times ; the fuzee P will be turned 4 times ; the strap I will be moved along the cones from the dotted line c" to d" ; the velocity of the upper cone A, together with the lathe mandril &c. will be doubled a third time ; the tool will have arrived at the Circle d" which is only one eighth of the diameter of the circle a" ; but as the velocity of the lathe mandril &c. is increased 8 to 1 the surface will have hitherto passed the tool always at the same velocity ; the strap I, will have arrived nearly at the end of the cones ; the handle of the lever 60 must be turned towards the left hand, then the strap I, will remain at the end of the cones till the tool has arrived at the centre of the surface.

The Chuck V contains four long screws ; they are secured in their places by four collars which act against the shoulder of the screws, and prevent any lateral motion of them ; each collar is fixed in its place by 2 pins : there are 4 screwed nuts, which are well fitted in long parallel holes or openings made in the Chuck, so as to slide to and fro without any shake ; the back part of the holes is a little wider than the front; on the back part of the nuts is a flanch which projects on each side of the holes and also rests against the back part of the chuck. the faces of the nuts are level with the face of the chuck : on the faces of the nuts are fixed, by four screws, flat plates or jaws, the edges of which are toothed like a file : the plates may be fixed across the holes if more convenient. There are also a number of dies or jaws of different shapes, which may be fixed to the nuts when required ; the outer ends of the long screws are made square, to which is fitted a key for turning them round ; therefore if the screws are turned round in one direction the nuts and dies will be forced towards the centre of the chuck, and will gripe or hold any thing that may be placed between them, but if the screws be turned in the contrary direction the dies or jaws will be drawn to the outer side of the chuck. This is a very convenient kind of chuck, for things may be fixed on it either concentric or eccentric.

There are many other kinds of chucks fitted to the lathe, but not shewn in the plates, they consist of the right and left handed screw or universal chuck,—right angle and bevel chuck,—four and eight screwed box chuck, centre chuck,—drill chuck &c. 61, is an index or point which is applied to the dividing plate on the face of the wheel W.

Fig 5 Plate 43. is a vertical section of the index point. and fig, 6 a side view ; they are drawn to double the size of that shewn in fig 2.

The index points commonly applied to dividing plates are fixed to the end of a spring and at right angles to it,—the point commonly projects before the spring an inch or an inch and a half, and when the point is placed in one of the holes in the dividing plate. a little strain or motion to turn the plate will cause the spring to bend in the middle and will of course hold the dividing plate very imperfectly.

The index point as shewn in fig 5 consists of a small cylinder made to slide in a socket ; there is a spiral spring placed in the middle part of the cylinder ; —one end of the spring acts against a shoulder in the socket, and the other against a shoulder on the cylinder, which pushes the point into one of the holes in the dividing plate ; the point is withdrawn from the plate by the action of a lever ; the socket is fixed in a hole made in the upper end of a piece of iron 62, which is about two inches by one, and which is strong enough to resist any strain that may be applied to the dividing plate without bending it. In the lower end of the piece 62 is a parallel hole through which passes a screwed bolt 63. 64 is a bracket which is fixed to the side of the mandril frame by two screws : the head and neck of the bolt 63 is round and well fitted in a hole made in the bracket 64 ; the middle part of the bolt 63 is made square and fitted to the hole in piece 62. so as to slide to and fro without shake : there is also a washer fitted on the square part of the bolt, and against which acts the screwed nut 65. The piece 62 together with the bolt 63 &c may be turned to and fro so as to adjust the point 61 to any of the circles or holes on the dividing plate, and may be fixed in that position by the nut 65. There is also a tangent screw 66, the neck of which is fitted into a round hole made in the lower end of the piece 62 and is secured from any lateral motion by a pin which passes through a hole made in the piece 62, and also through a groove made in the neck of the screw 66. The screw also passes through a screwed hole in the square part of the bolt 63. There is also a micrometer wheel fixed to the head of the screw 66, which is divided into 100 parts ; the edge of the piece 62 (op-

posite the washer) is divided so as to point out each turn of the screw 66, therefore the distance between any of the holes in the dividing plate, may easily be subdivided, by first ascertaining the number of turns of the screw and also parts of a turn on the micrometer, and then dividing them by the number of the divisions required between the holes of the plate.

Fig 1 *b* plate 42 is a section of the centre or poppet head. Fig 4 plate 43 is a view of the centre end of the head; there is a cylindrical hole made through the upper part of the centre head into which is fitted a steel cylinder 70; in the right hand end of the centre head(see fig 1 *b.*) is sunk a hard steel collar driven in so tight as to prevent it from turning round. There is a round hole in the middle, of the collar, in which is fitted the neck of a long screw 67. 68 is a gun metal cap which is secured on the right hand end of the centre head; there is a round hole made in the middle of the cap in which is fitted the outer end or neck of the screw 67: there is also a boss or shoulder on the screw, one end of which acts against the face of the collar, and the other against the inside of the cap 68; the cap may be screwed up so as to prevent any lateral motion of the screw 67: on the outer end of the screw is fitted a handle or winch 69. There is also a round hole made thro--' ^^ middle of the cylinder 70, the middle part of the hole is a little more in diameter than the outside of the thread of the screw 67; the hole in the right hand end of the cylinder 70 is made smaller and screwed so as to fit the screw 67, 71 is a large centre chuck which is screwed into the left hand end of the cylinder 70. Fig 10 plate 43 is also a centre chuck, into which are fitted smaller centres by means of a hole bored through it a little conical, into which one end of the centre is fitted, and if driven tightly is thus prevented from turning round: centres made in this way may be easily removed or changed for a hollow centre.

Figs 11 and 9 plate 43 are two chucks, which may also be screwed into the end of the cylinder 70, the faces of which are for placing or holding any thing against to be drilled, 72 plate 42 is a set screw, screwed through a hole made in the upper part of the centre head; the lower part of the hole is made wider to receive a piece of gun metal which is fitted into it, the under side of the piece of gun metal is fitted to the cylinder 70 and the end of the set screw 72 acts against the upper side of it.

The piece of gun metal is to prevent the screw from injuring the cylinder, and the set screw is to fix the cylinder in any required position.

There is a square groove made along the under side of the cylinder 70.73 is a pin which is driven into a hole made in the centre head, the upper end of the pin is made flat and is fitted and also projects into the groove on the lower side of the cylinder; the pin is to prevent the cylinder from turning round; therefore if the handle 69 of the screw be turned in one direction, the cylinder 70 will be forced out of the head and if turned in the contrary direction, the cylinder will be drawn into the head as shewn at fig 1 b; 74 and 75 are the screw and washer for fixing the centre heads to the lathe bed, a similar set are used for fixing the mandril head to the lathe bed.—*Trans. Soc. Arts.*

THE PATENT LUNAR CORRECTOR.

We have had the pleasure of inspecting a newly invented nautical instrument under the title prefixed to this notice, the invention of Captain Andrew Thompson of this city, which is thus spoken of in the *Times* of February 11, 1846:—

"The "LUNAR CORRECTOR."—This invention, which is of considerable importance to all persons engaged in nautical pursuits and tactics, belongs to Captain Andrew Thompson, one of the most experienced and scientific officers in the mercantile navy of this country. It consists of an instrument, the principle of which depends upon the minute variation of small spherical triangles. The instrument is formed by having an index similar to a sextant, on which is set the apparent distance. The index bar and limb are graduated, and furnished with moveable, slides, for performing what is termed 'Laying off the apparent altitudes; the slides being graduated also to a scale proportioned to the radius of the instrument, show

at the point of intersection, a number of minutes and seconds which is the first correction; and then, by the help of a brief table, the true distance is at once obtained. The great advantage of this instrument is its simplicity, and the little time which, by the use of it, is required to work a lunar observation; in fact, the time required scarcely exceeds that required to find the latitude by a meridian altitude of the sun. For those navigators who are less expert than their more scientific brethren, and less accustomed to the rigour of very accurate and perplexed calculations this instrument is a great boon; it affords an unerring method of working problems in spherical observations, and to the more experienced lunarian it is also a valuable acquisition, because it not only facilitates his labours, but serves as a test to prove their correctness. It is difficult to describe this invention by words only, or even by drawings, but it may be seen and its value appreciated at once by any one capable of understanding the value of a scientific invention."

The instrument was in its original and imperfect state submitted to the examination of the London Board of Trinity, and also to the Board of Admiralty, who then reported it capable (when in adjustment) of giving the true distance within 10 to 15 seconds of the truth.

The inventor since then has altered the form of the Lunar Corrector and has computed a more perfect Table. The instrument in its new form presents a square enclosing two graduated circles one of which revolves within the other. This not only simplifies the operation, but has considerably reduced the price, a great desideratum, as it brings it within the reach of that class of Navigators (unfortunately a numerous one) who have not the means of purchasing valuable, but expensive instruments. A Table of Refractions occupies one half of the inner graduated circle for finding the sun's or star's correction, and in addition to its use as a lunar corrector, the instrument, by a simple and easy process, enables the observer to determine the time at which any heavenly body will rise or set.

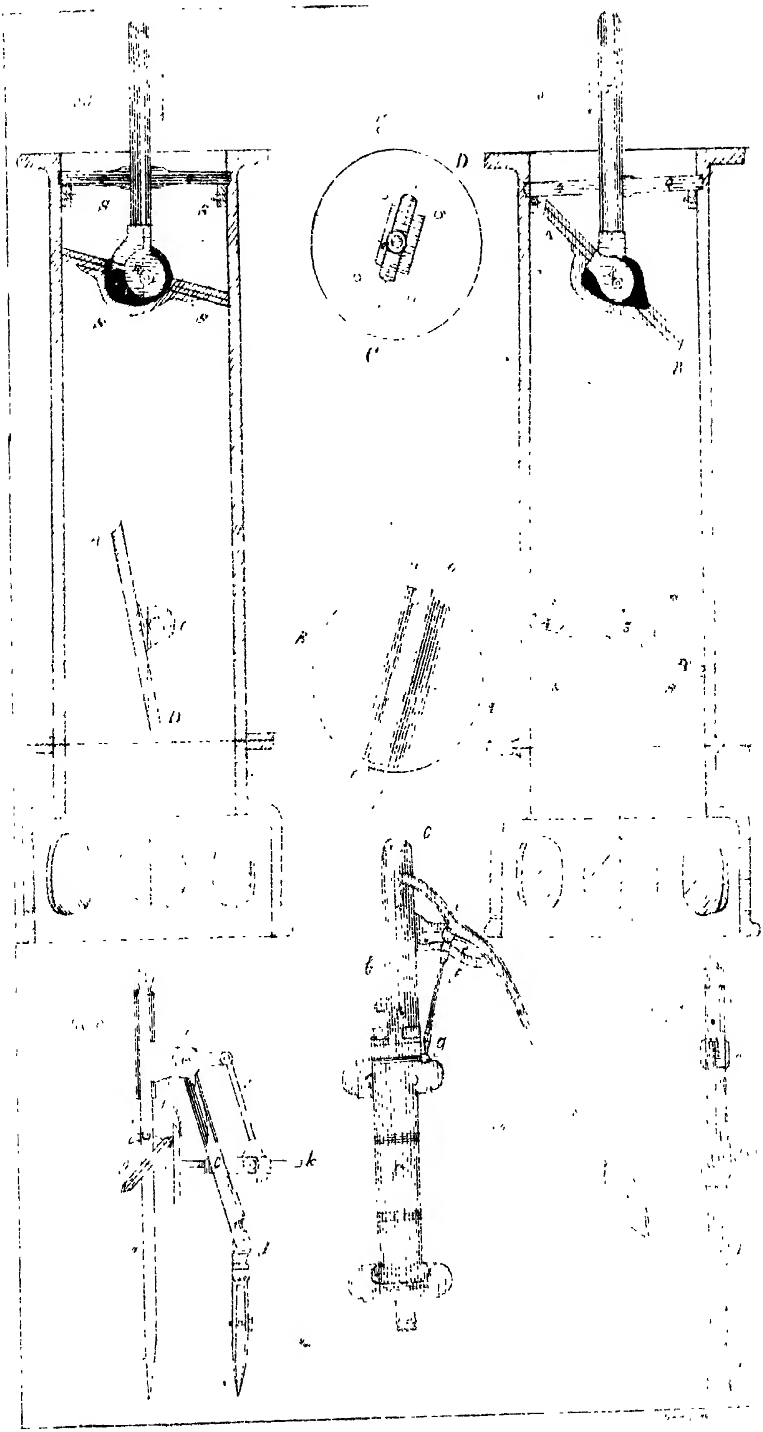


Fig 1

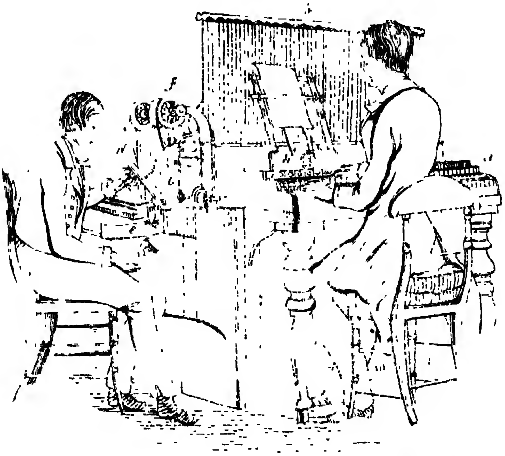


Fig 2

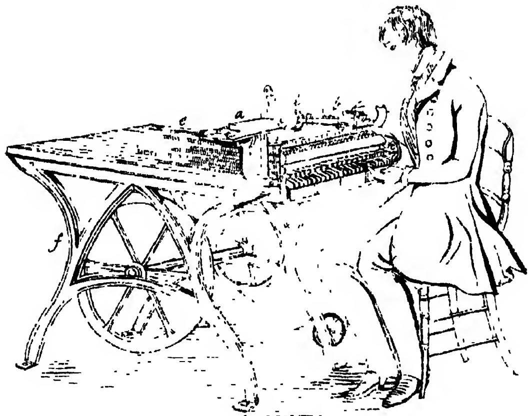
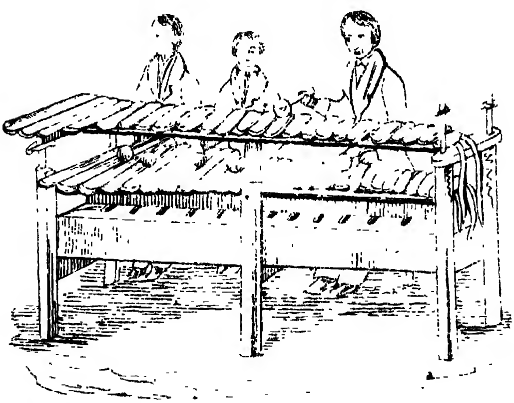


Fig 3



From Illustrated London News, & Magazine of Science

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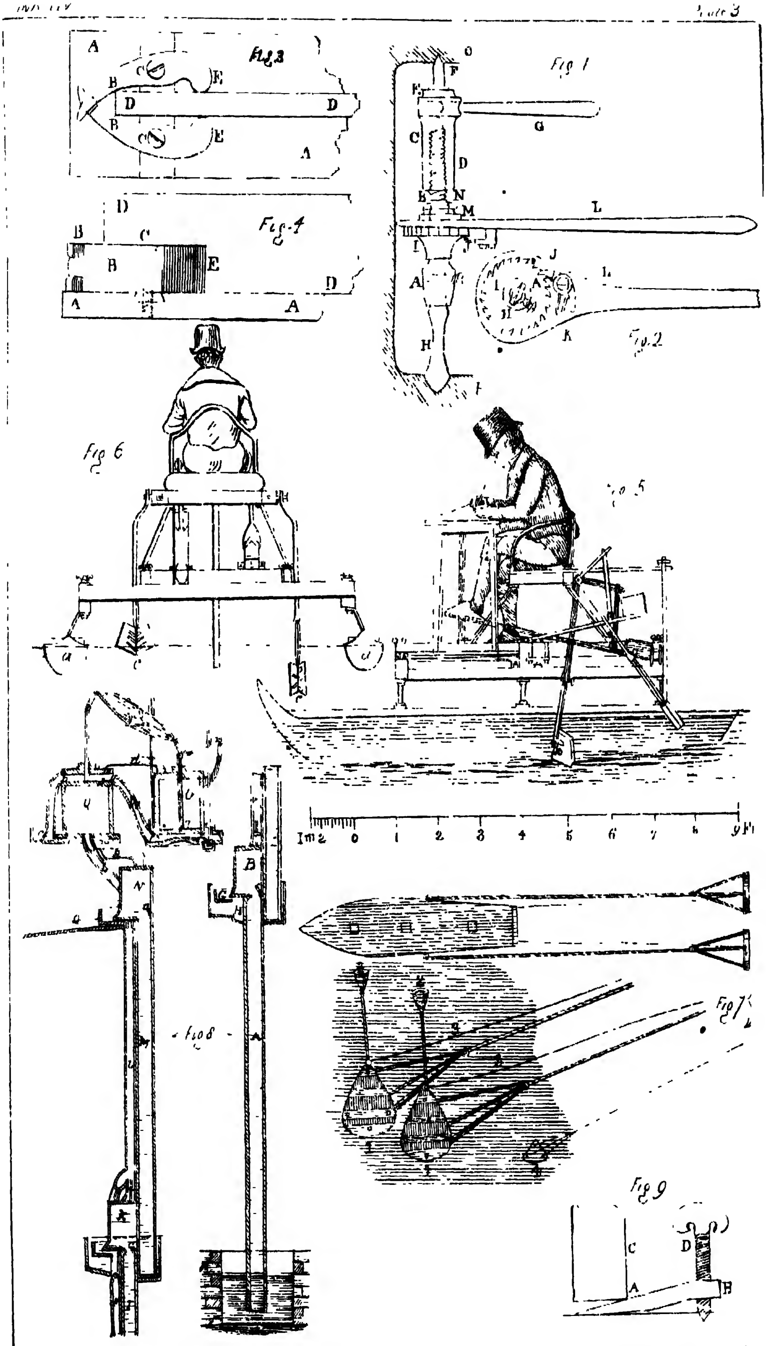
Fig 1
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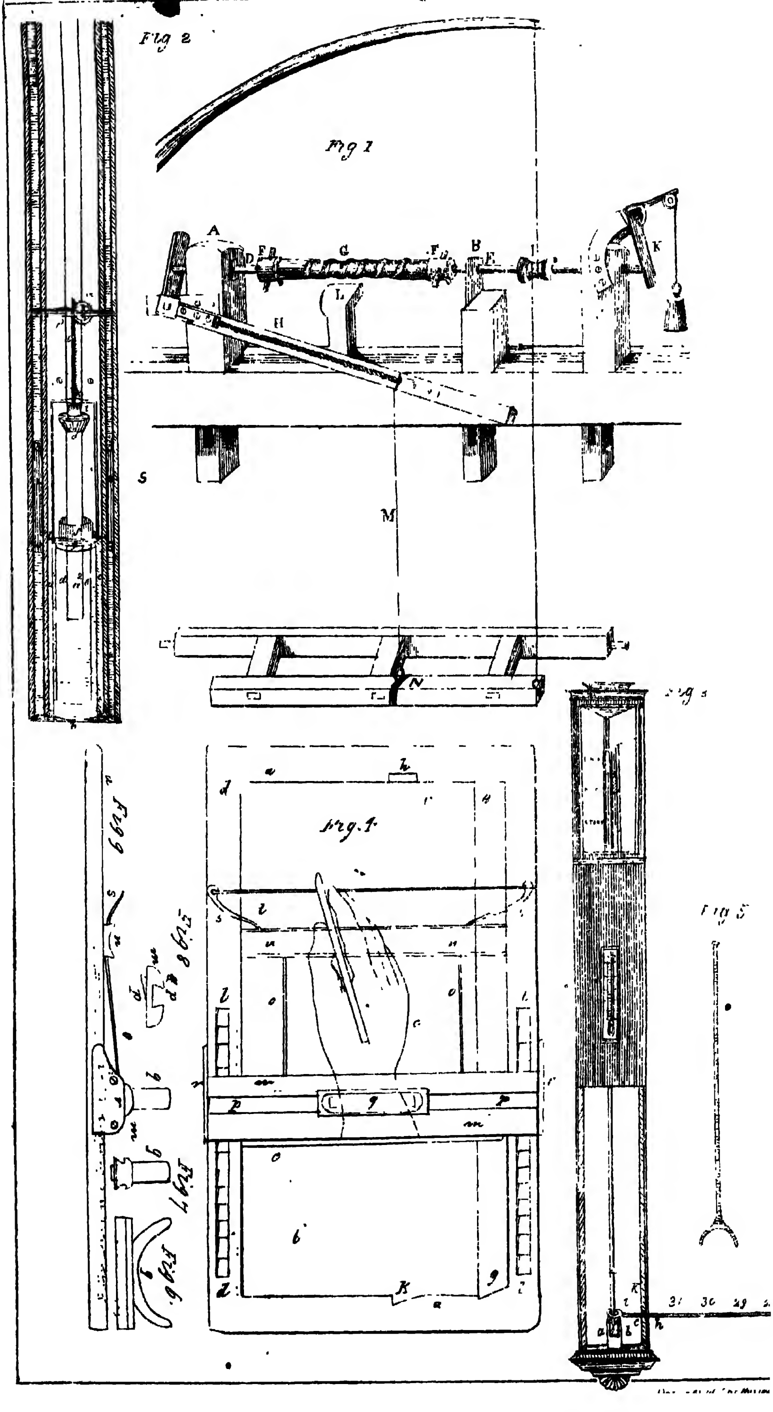
Fig 2
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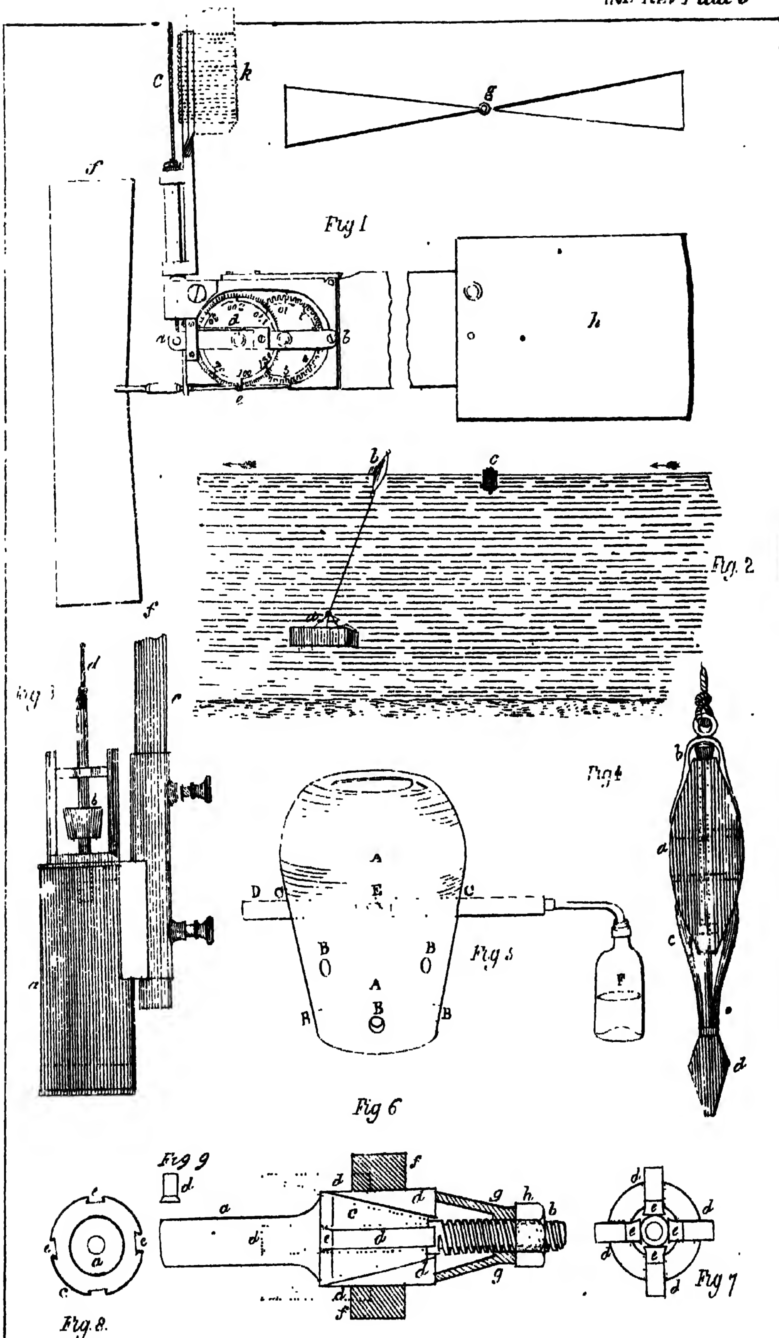

Desmond Chalker jer. Lith

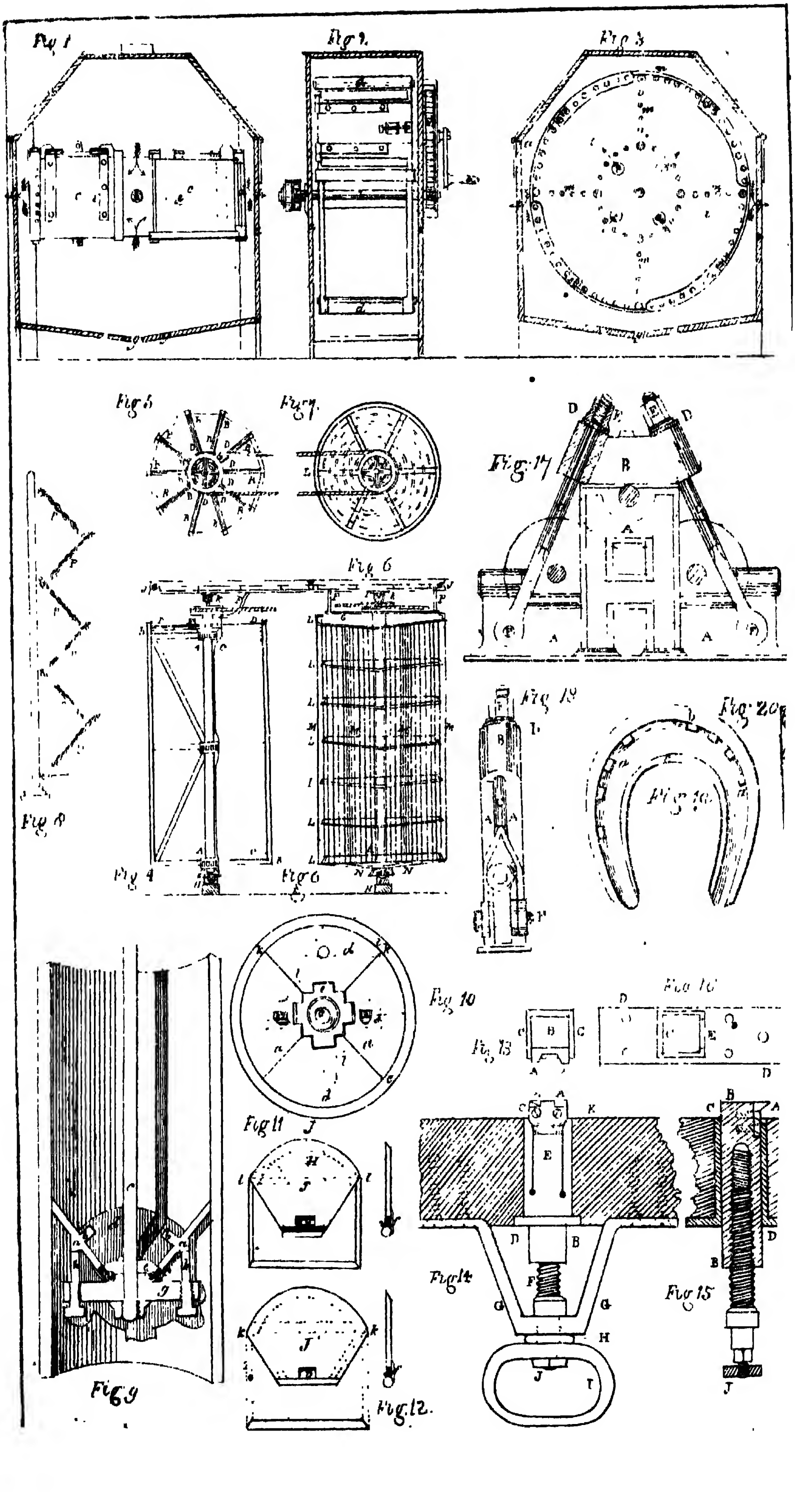
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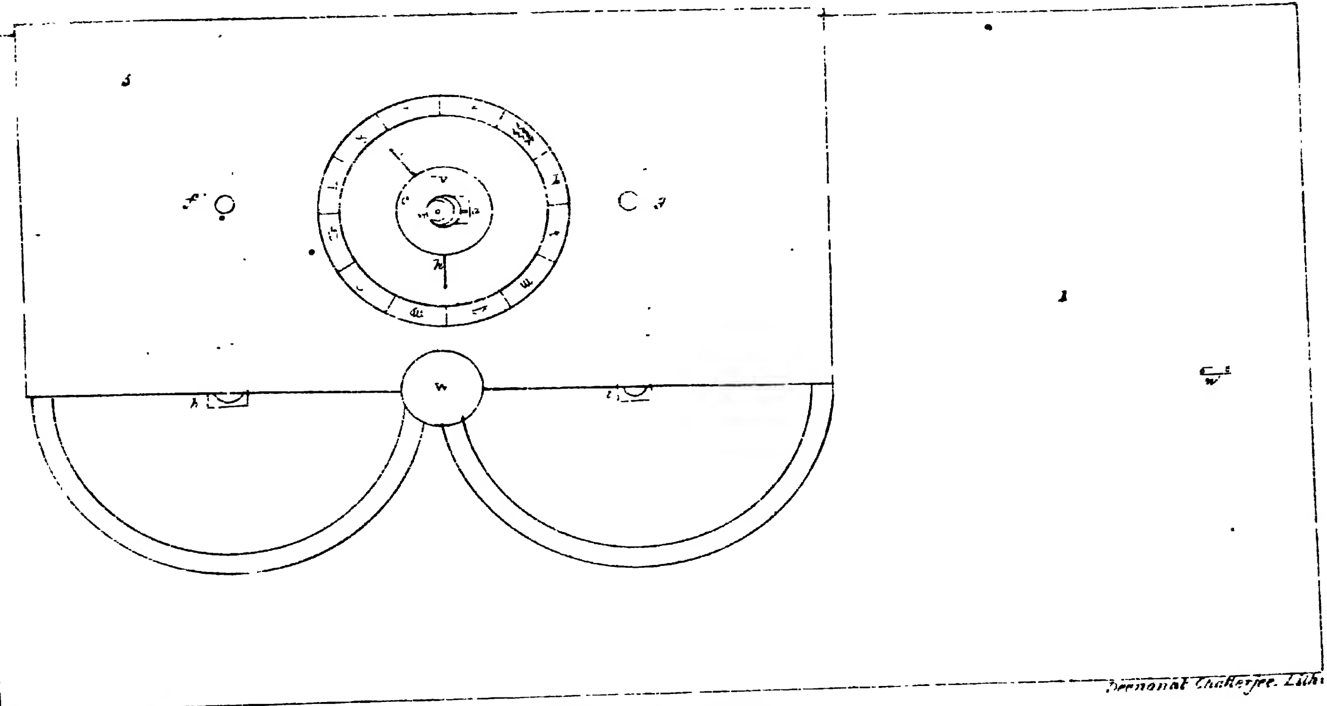
Fig 14
Fig 15
Fig 9
Fig 12.

Ind Rel vol. 1

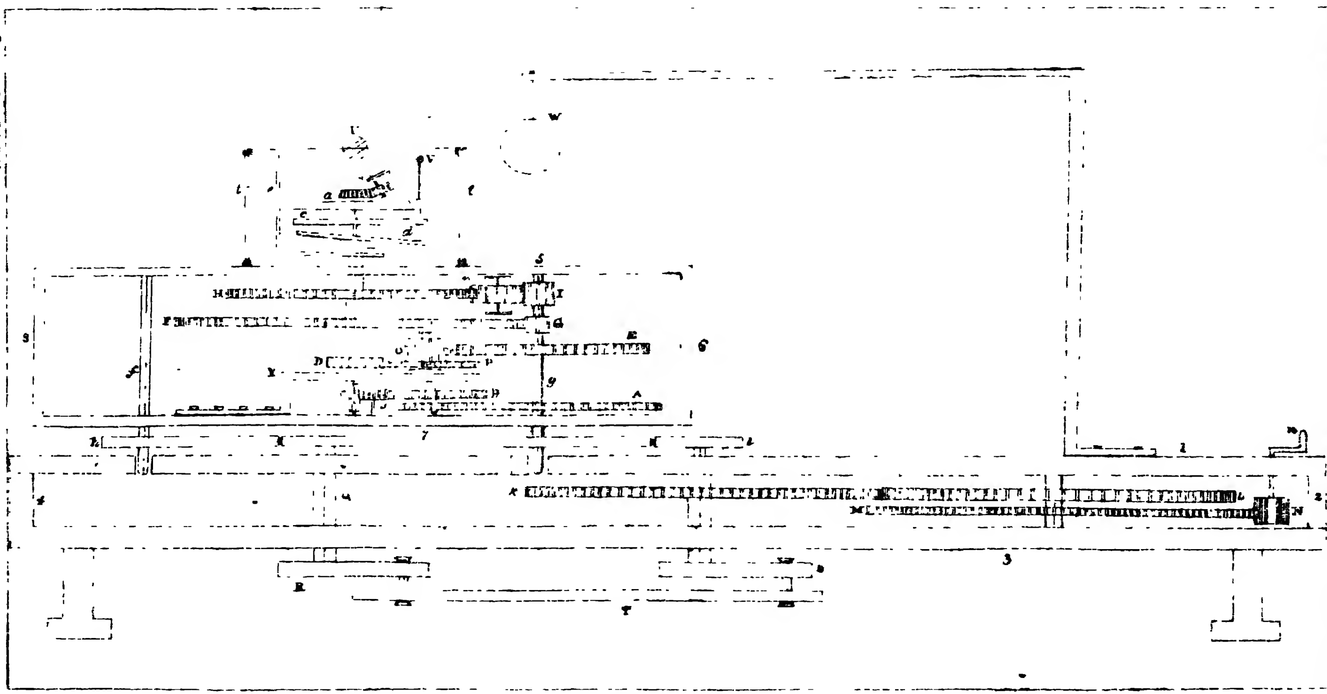


Deenonath Chatterjee. Lith.

From Amer Jour Science vol XLII No 2

THE TELLURIUM.

An Astronomical Machine by Edwin C Leedom M.D. Plymouth Pa.



THE TELLURIUM.

An Astronomical Machine by Edwin C Leedom M D Plymouth Pa.

From Amer Jour Science Vol XLII No 2

Deenonath Chatterjee Lith.


THE COMET.

Fig 1.

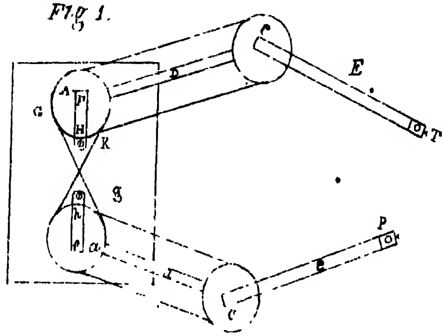
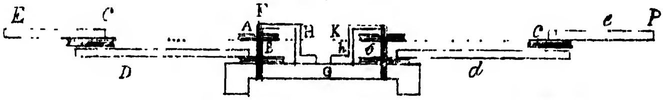


Fig 2.



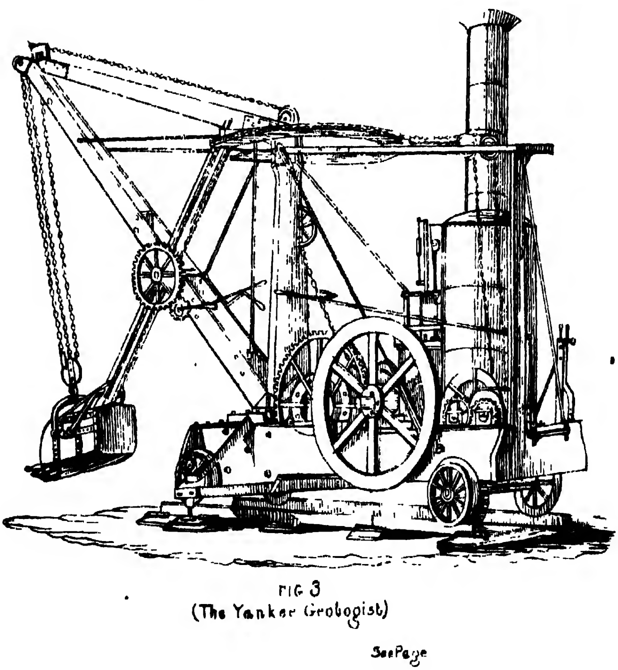


FIG 3
(The Yankee Geologist)

See Page

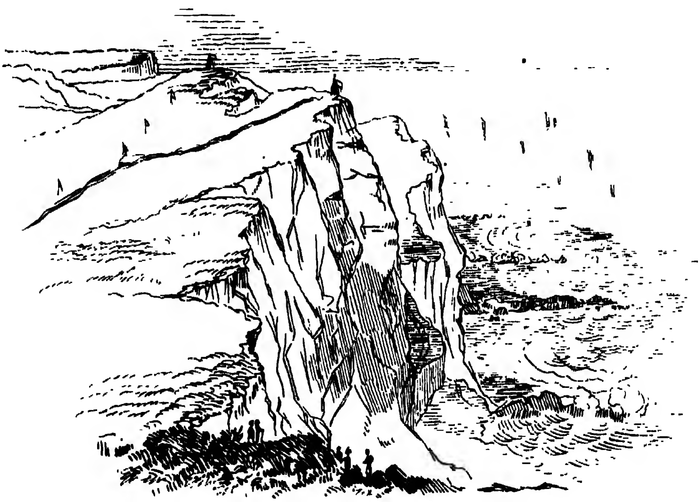


Fig 1

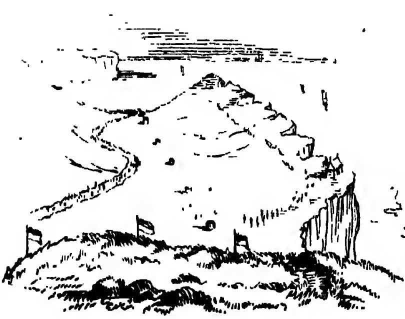


Fig 2

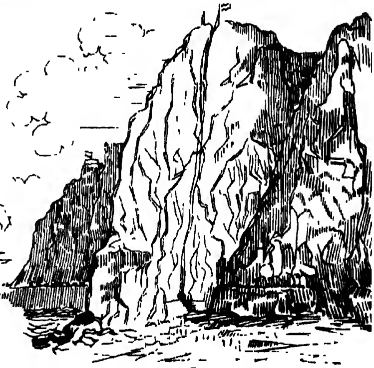


Fig 3

Fig 4

Fig 3

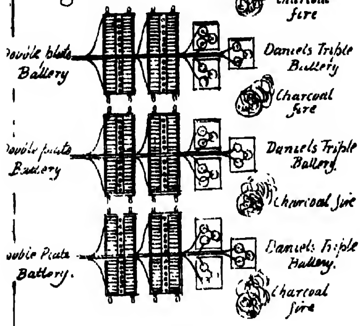
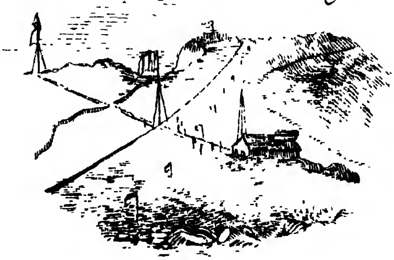


Fig. 2



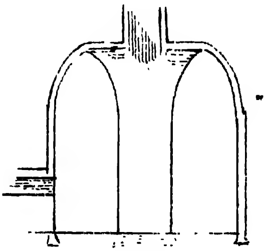
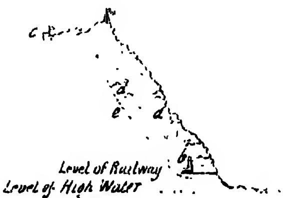


Fig 1.



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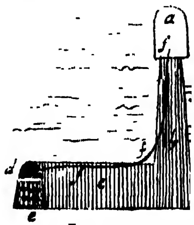

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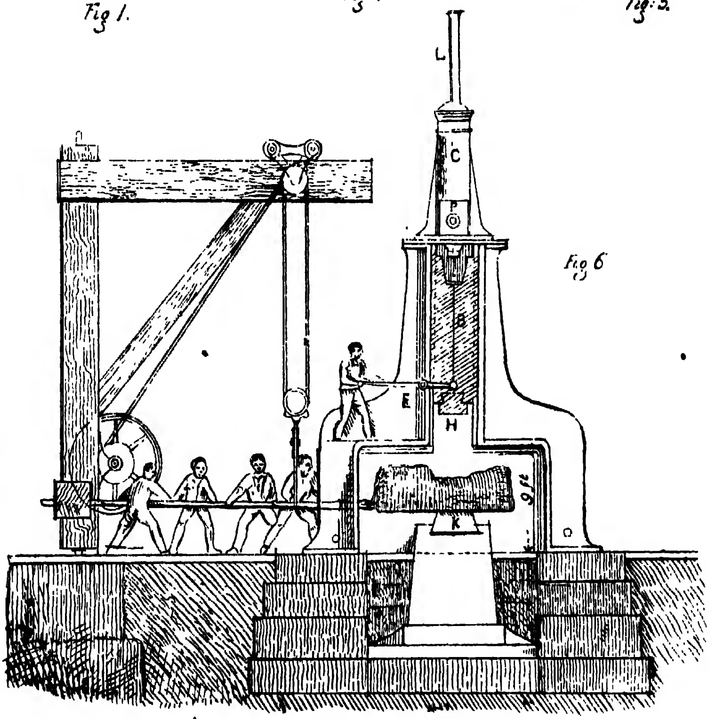
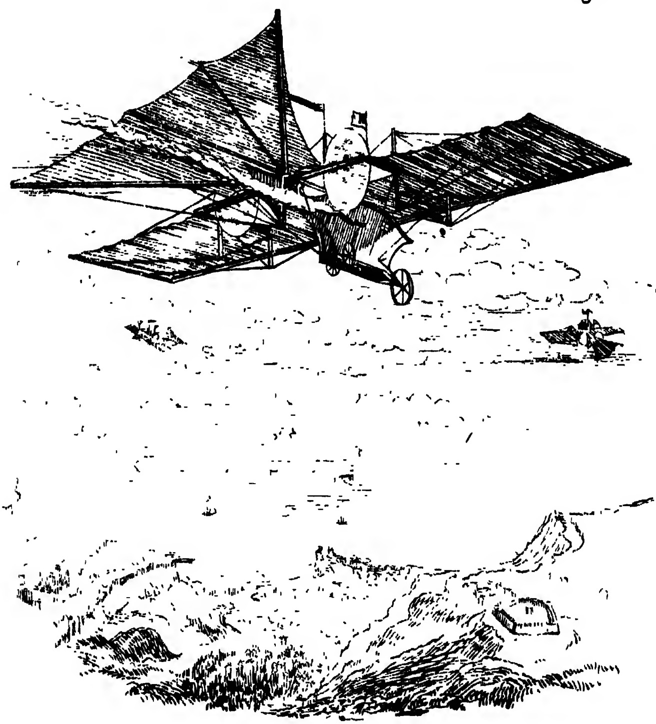


Fig 6

Fig: 1.



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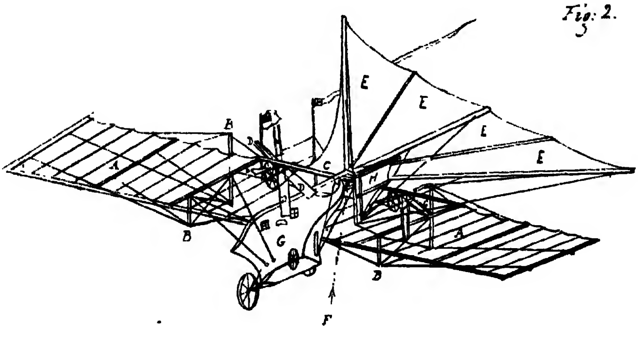
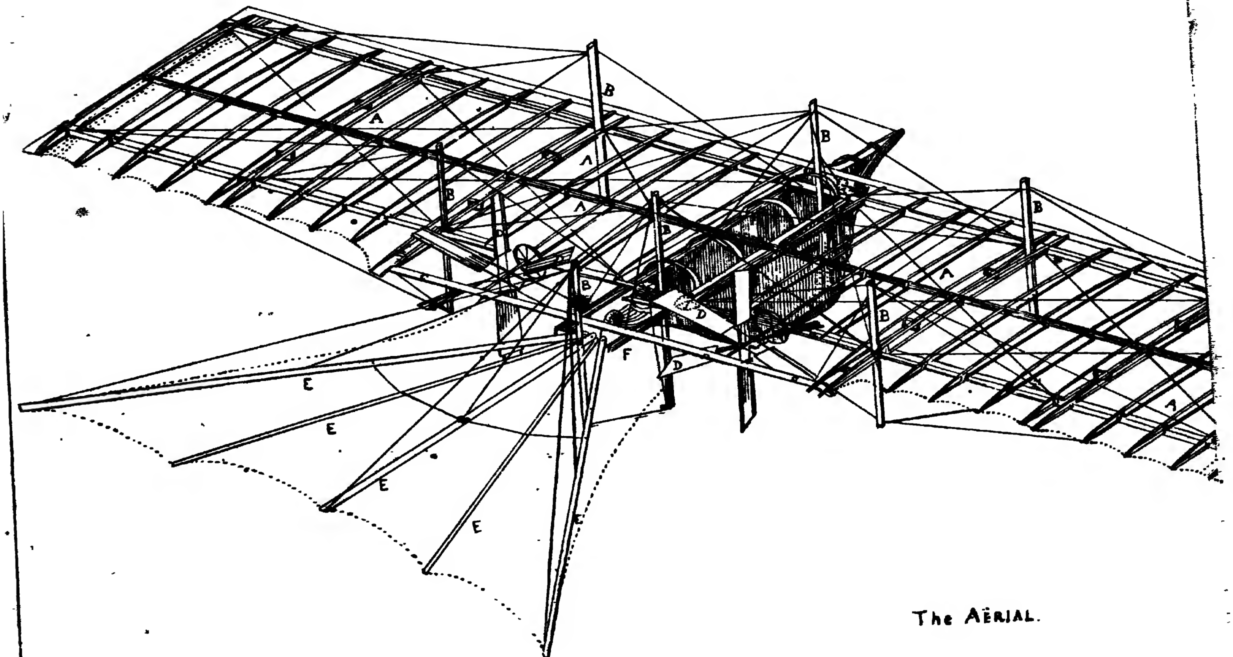
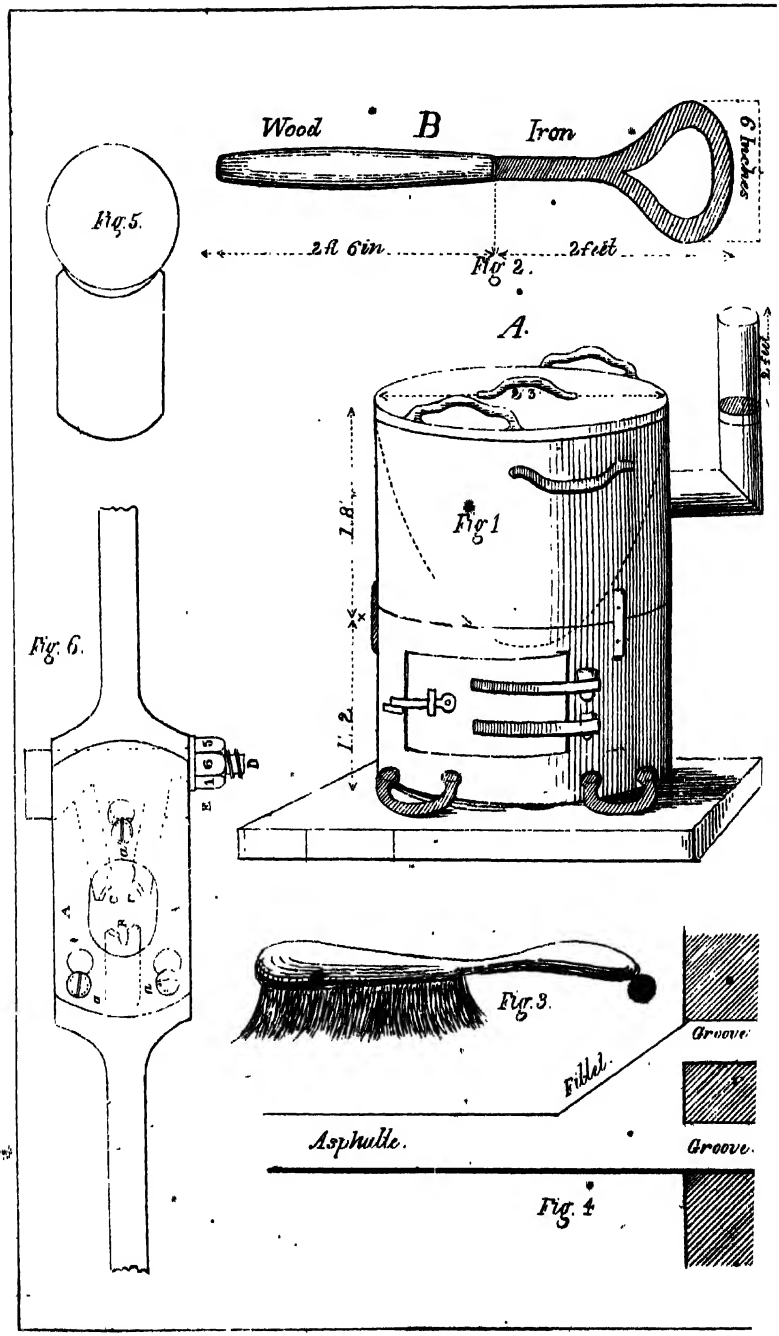
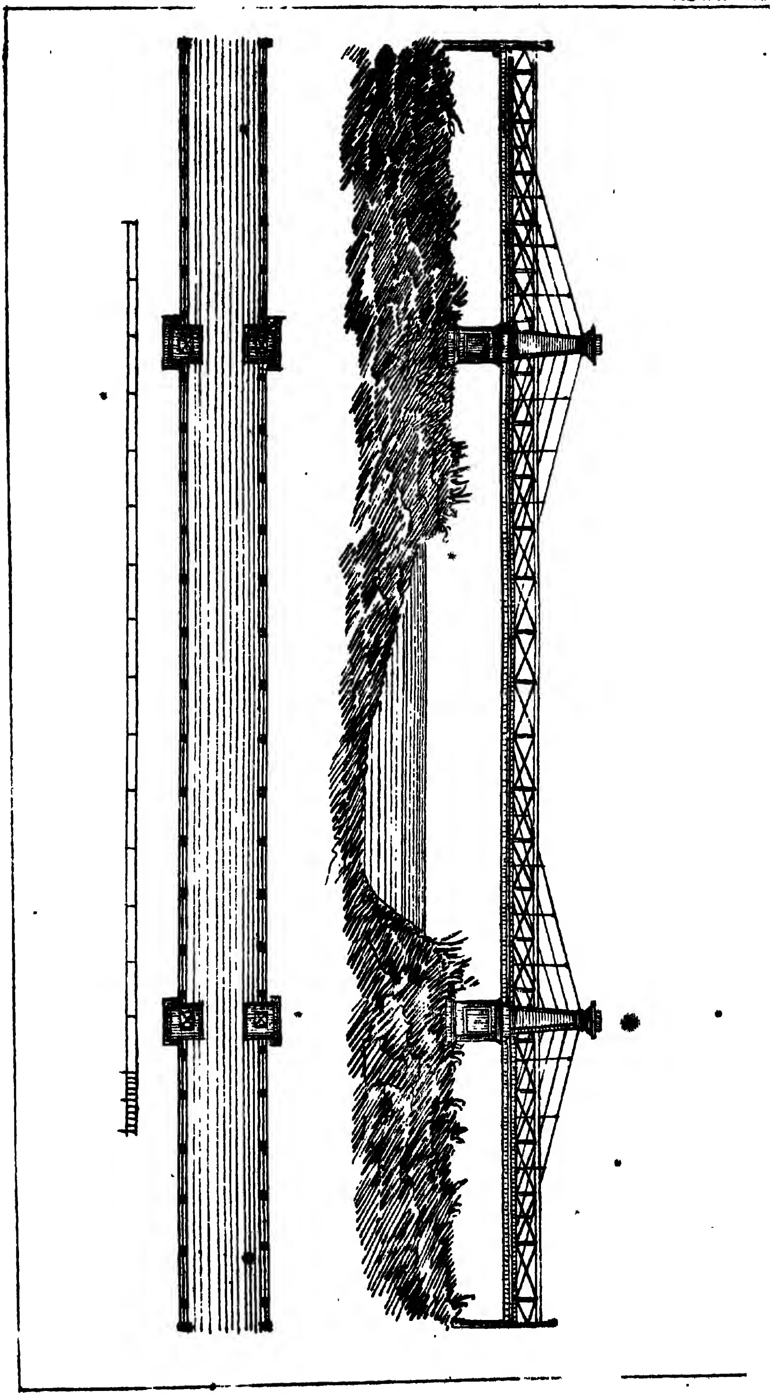




The AËRIAL.

From the ATLAS for INDIA.


Wood
B
Iron
6 inches
2 ft 6 in
2 feet
Fig 2.
Fig. 5.
A.
Fig 1
1.8'
1.2
Fig. 6.
Fig. 3.
Groove
Fillet.
Asphalte.
Groove.
Fig. 4



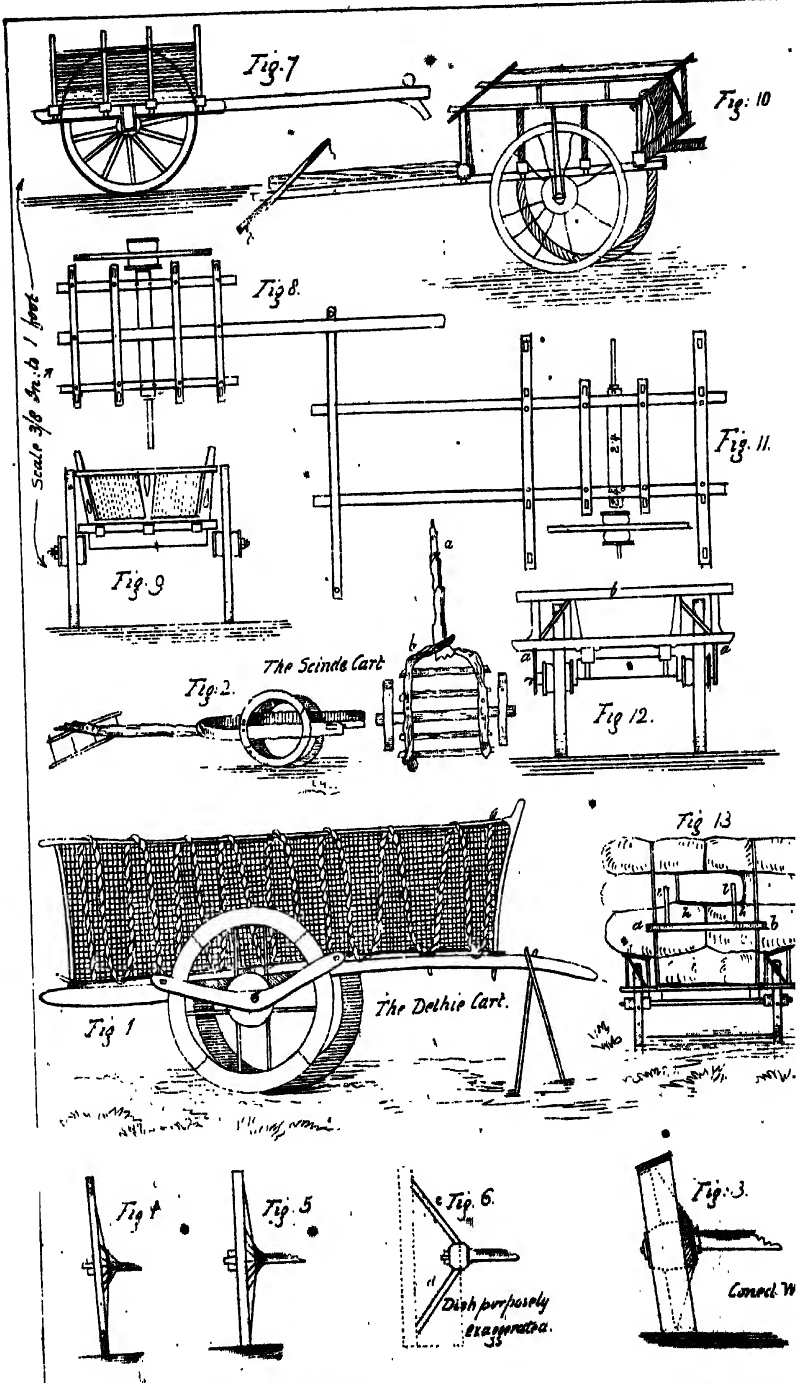
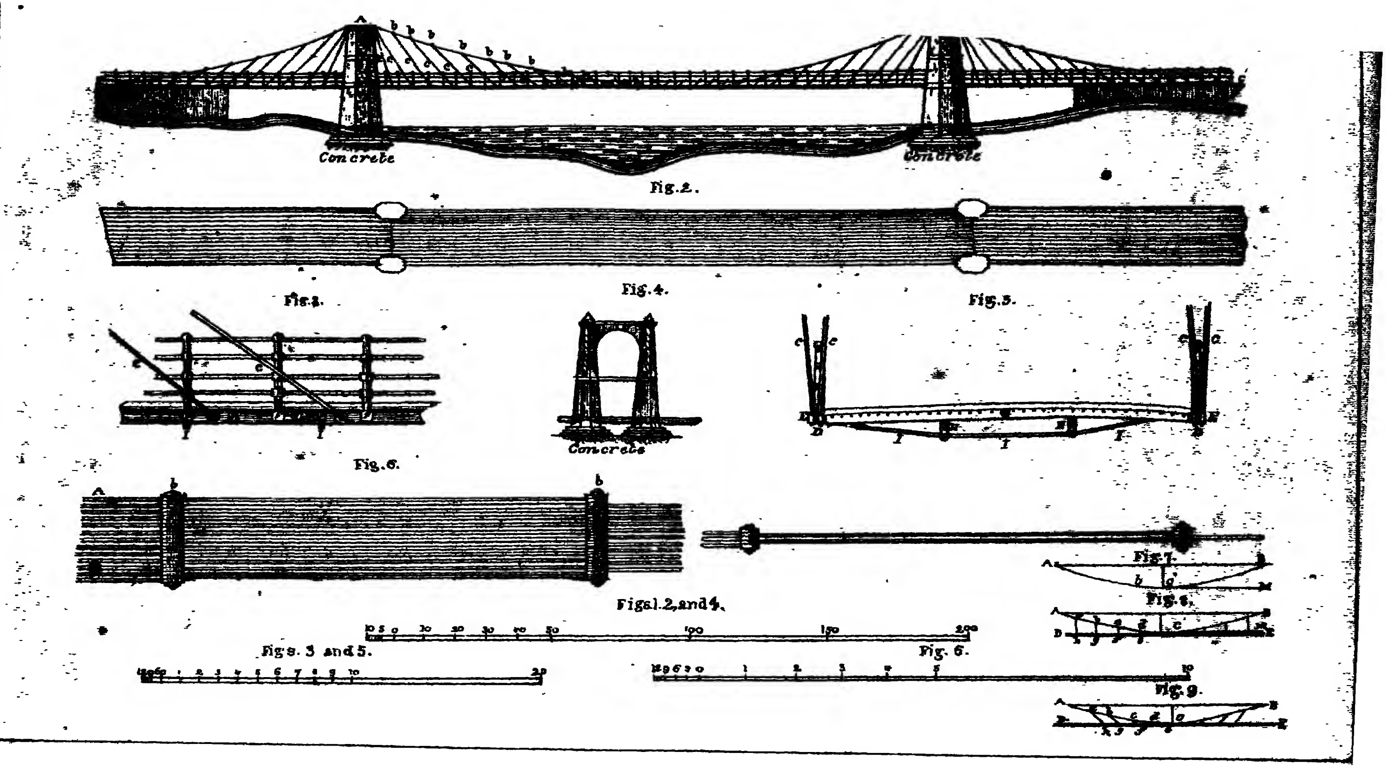


Fig. 7
Fig: 10
Fig 8.
Fig. 11.
Scale 3/8 In: to 1 foot
Fig. 9
The Scinde Cart
Fig: 2.
Fig 12.
Fig 13
The Delhie Cart.
Fig 1
Fig 4
Fig. 5
Fig. 6.
Dish purposely exaggerated.
Fig: 3.
Coned. W


Fig. 1.
Fig. 2
Fig. 3
Fig. 4.
Fig. 5.
Fig. 6
Fig. 8.


Concrete
Concrete
Fig.2.
Fig.4.
Fig.3.
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Concrete
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Figs.1.2,and4.
Figs. 3 and 5.
Fig. 6.
Fig.7.
Fig.8.
Fig.9.

[illegible] [illegible]

Mr Herschell's Discourse on natural Philosophy is the finest Work of philosophical Genius which this Age has seen. No other man since Bacon could probably have produced a match for it in its own Province. Markoulofs

Goulds

Robt. Brooke -

Raywell 31 May 1831

J. South

Wm. Lawrence

Thomas Taylor.

J. M'Gregor

G B Airy

J Pond

J. Inman

J A Paris

Jos: Gwilt

H Holt Morgan

P. M. Roget

T R Malthus

J E Smith

J W Lubbock

[illegible]

George Rennie

Martin Archer Shee

J Wyatville

W. Whewell

Thos. [illegible] James D. [illegible] W. Brockedon

W. S. Stratford J. Thelwall J. Elliotson

John Stevens Henslow John Knowles

Rod. I. Murchison Thomas Allan [illegible]

William Wyon Thomas Galloway

Baden Powell Wm. Henry Fitton Wm. Prout

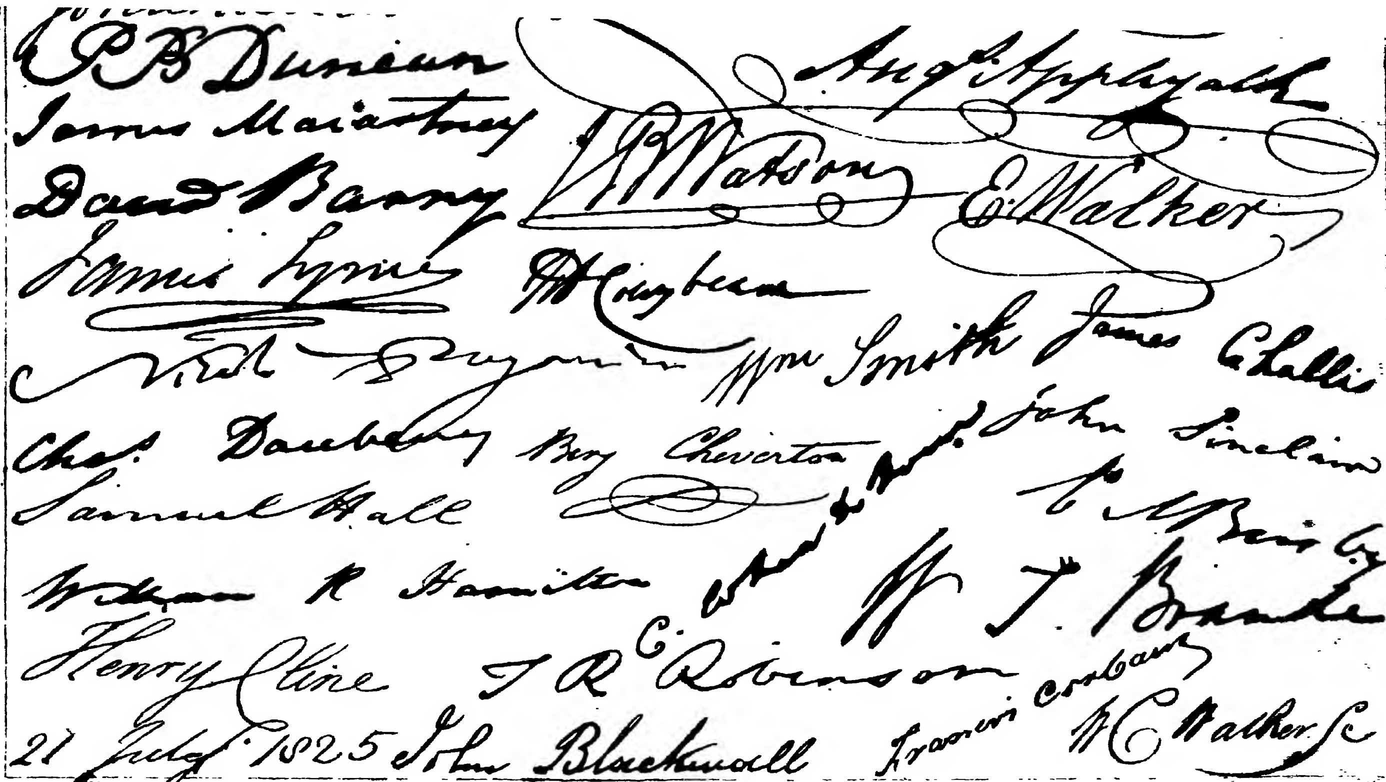
Chas: Robt. Cockerell [illegible]

John Haviland G. B. Greenough R. Blake

J. F. Daniell J. Cumming John Taylor

Thos. L. Donaldson James Heath

Heaton Brothers P. Lecount James F. W. Johnston



Mechanics Mag

B C Brodie Robt. Heate Robt. Stephenson

M Brunel G. W. Featherstonhaugh Venturi

J Gourlay P. Roget

J. A. J. Cauvin. John Ross Capt. R.N. Bouvard

Johannes Baptiste John Franklin

W Lowry John Barton

W ... Saml. R. Meyrick Will Buckland

William Symington De Salle Gilbert T. Burnett Edw. Ce

Mary Somerville Savary M. Lacroix Jomard Salmon G. Cosland

R. S. Joynes. S. P. Rigaud W Morgan

Jos: Banks C Rumker J Bostock

Hans Christian Oersted S. Dawning Robert Stevenson

John Robison. Thomas Thomson Saml L Dana Jr. John Dalton

Thos. Chas. Hope John Curtis Edw. Blore G J Guthrie

Robt. Bakewell [illegible] Henry Ellis

Wm Ritchie James Ivory Edwd. Turner

J R Young Geo Stephenson J Riddle

Edward Sabine Chas. Fowler John Kennedy

Alfred Gautier Wm Bentley D. Alexr McConochie

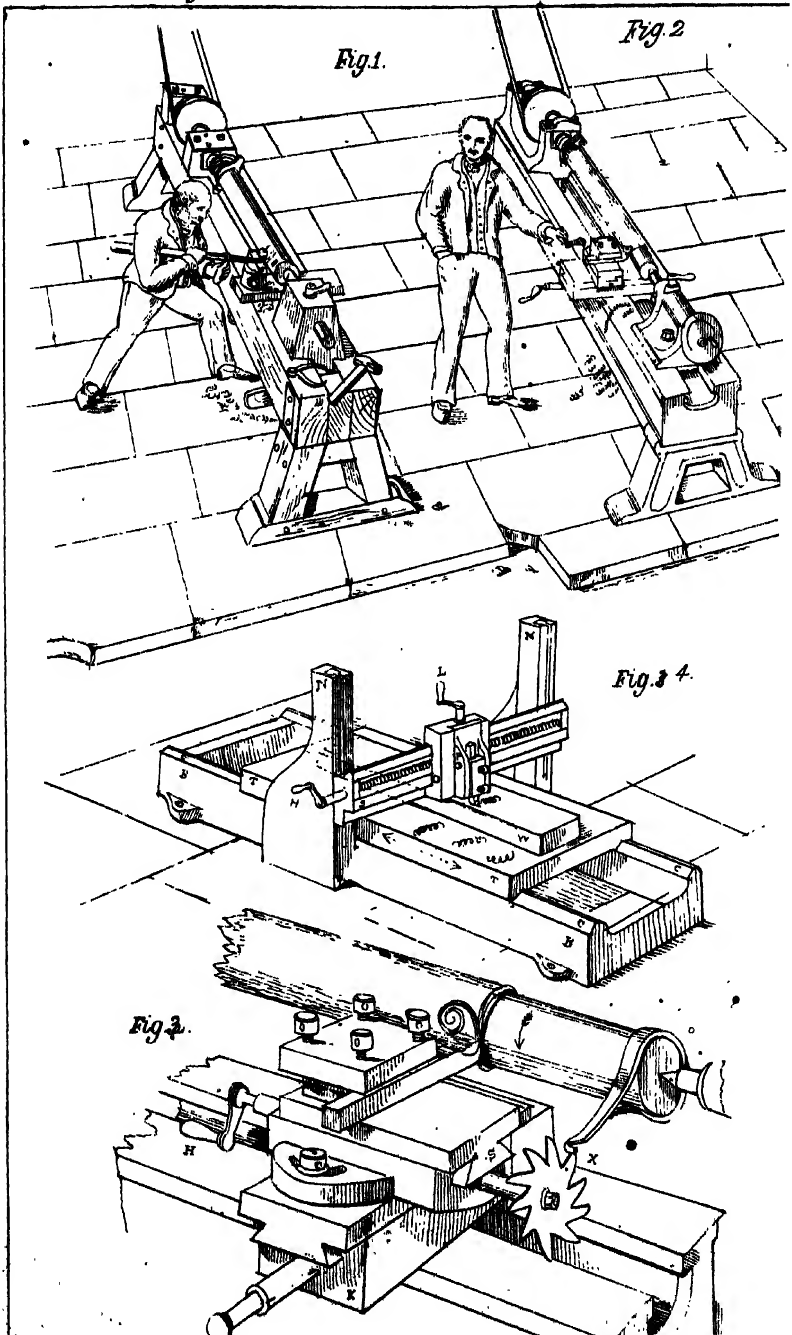
W. Sturgeon

B Travers Chas Konig

Henry Kater Dufrenoy A B Granville

John Isaac Hawkins C Waterton Thos P Jones

Ind Rev Plate 29.



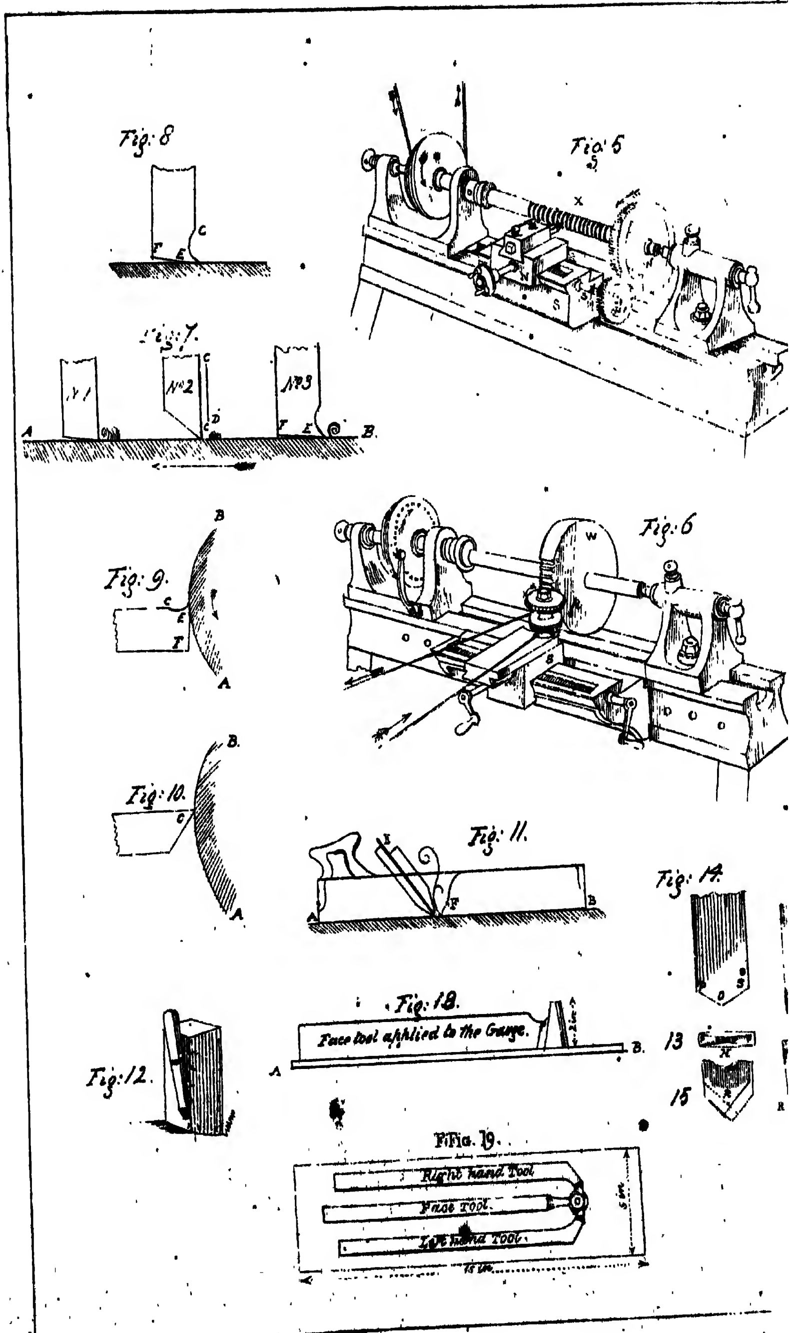


Fig: 8
Fig: 5
Fig: 7.
Nº 1
Nº 2
Nº 3
Fig: 6
Fig: 9.
Fig: 10.
Fig: 11.
Fig: 14.
Fig: 18.
Face tool applied to the Gauge.
13
15
Fig: 12.
Fig. 19.
Right hand Tool
Face Tool.
Left hand Tool.

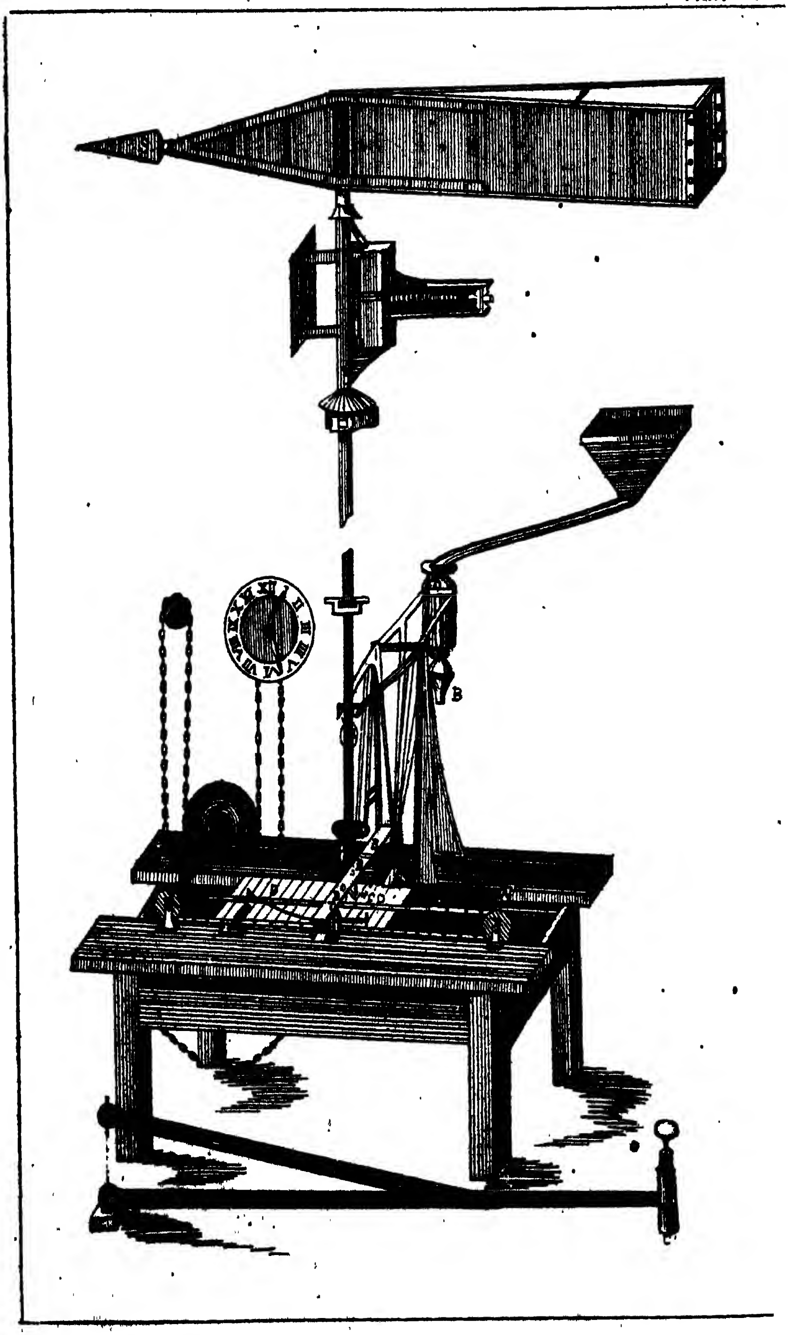

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Fig. 1.

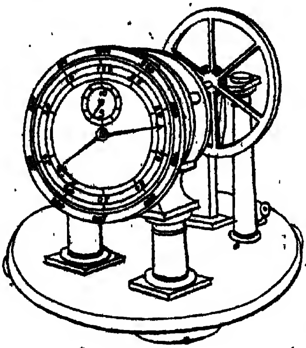
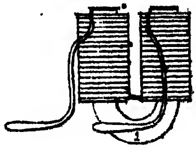


Fig. 3.



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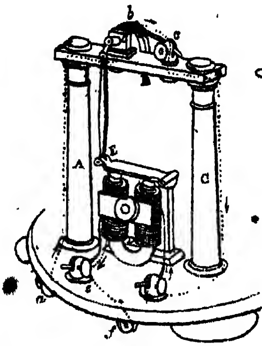
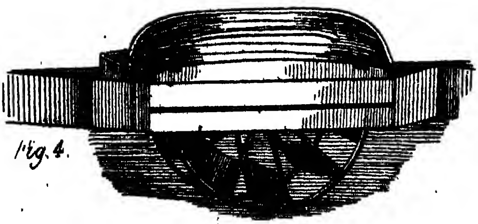
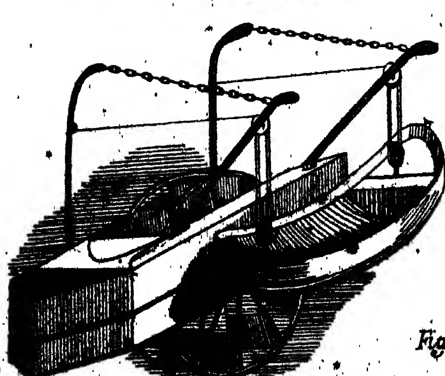


Fig. 4.





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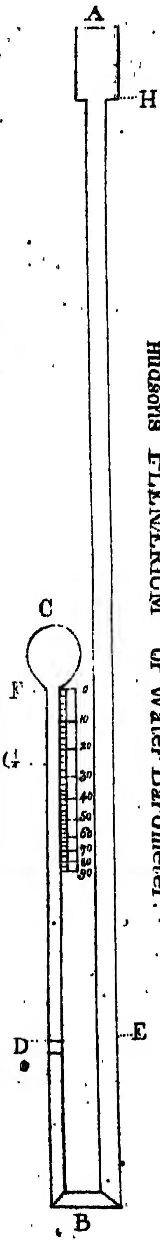


Hudson's PLENERIUM or Water Barometer.

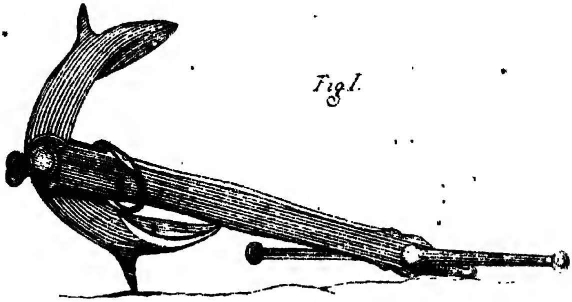


Fig. 1.

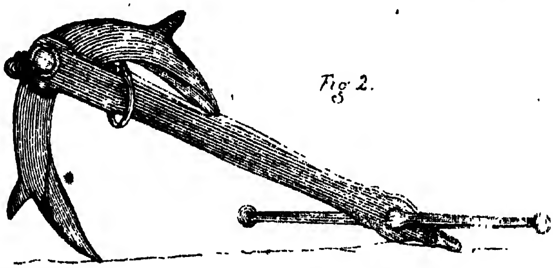


Fig. 2.

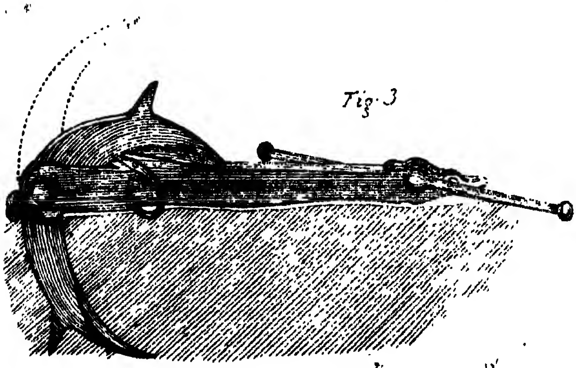
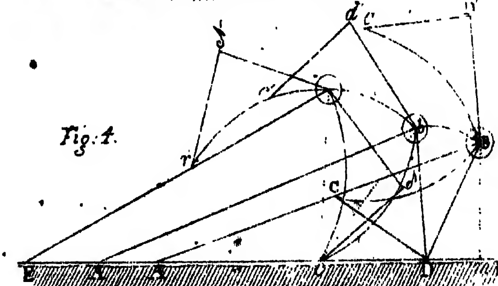


Fig. 3



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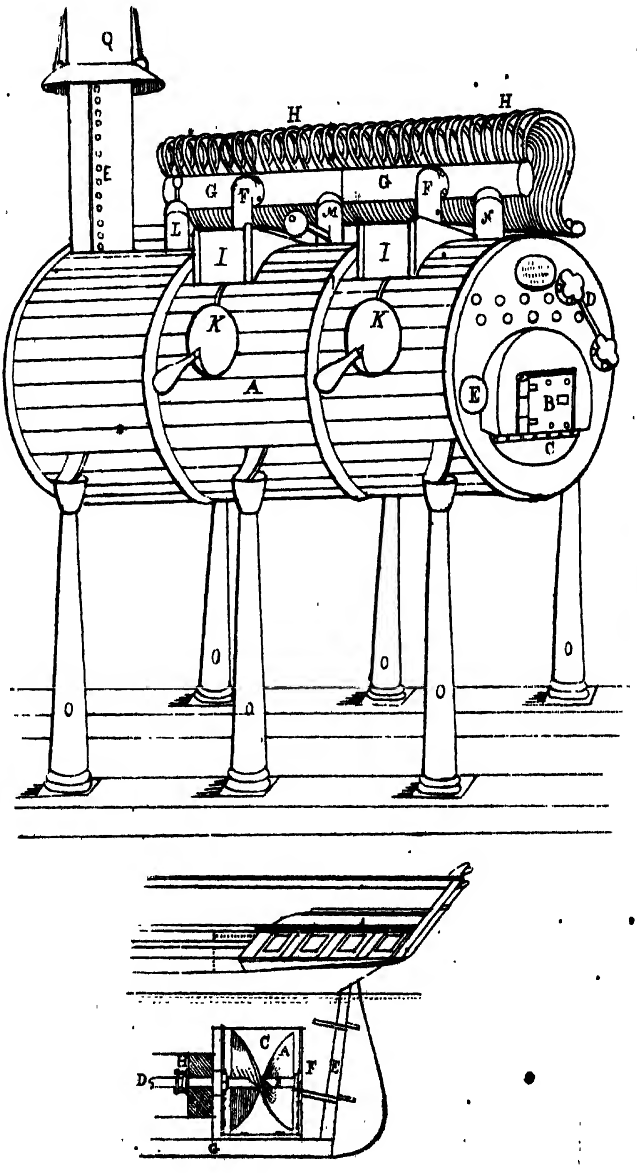
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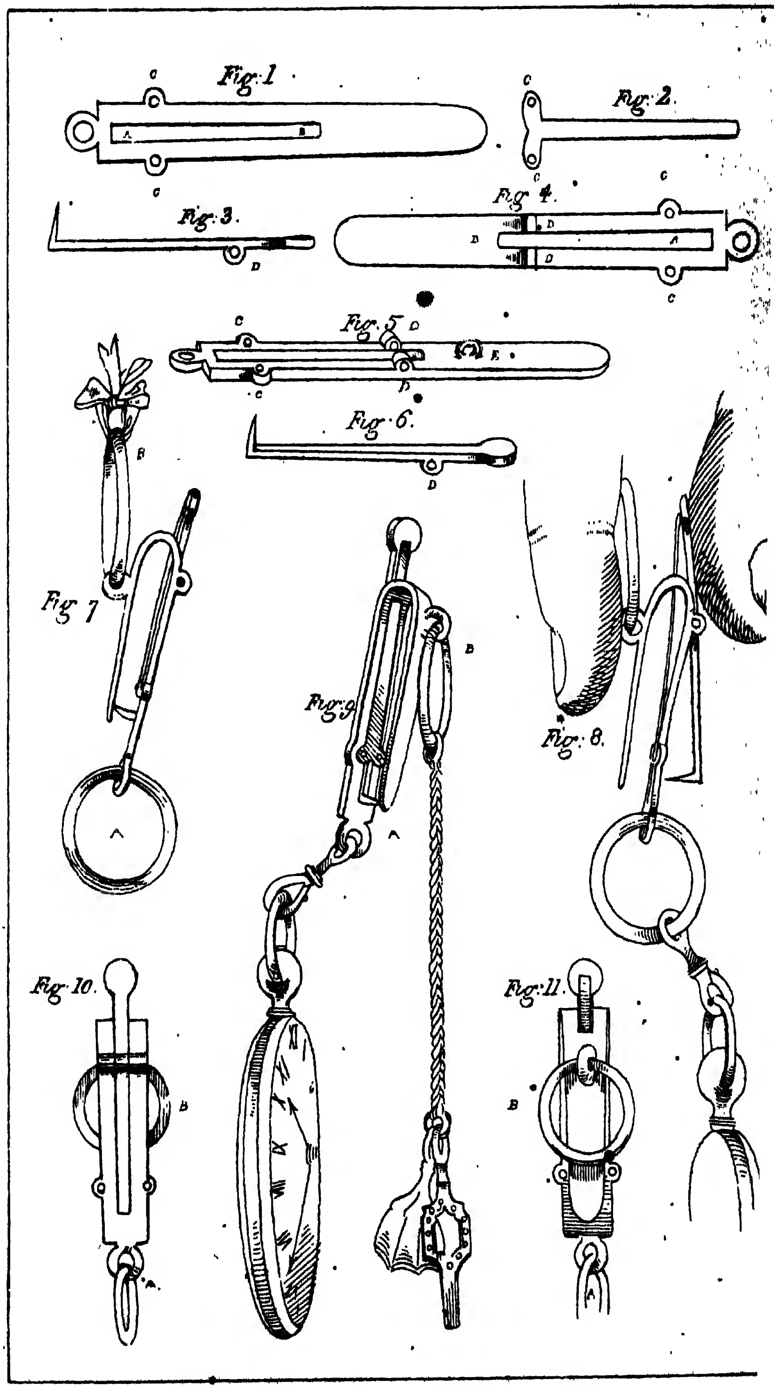
Fig: 1
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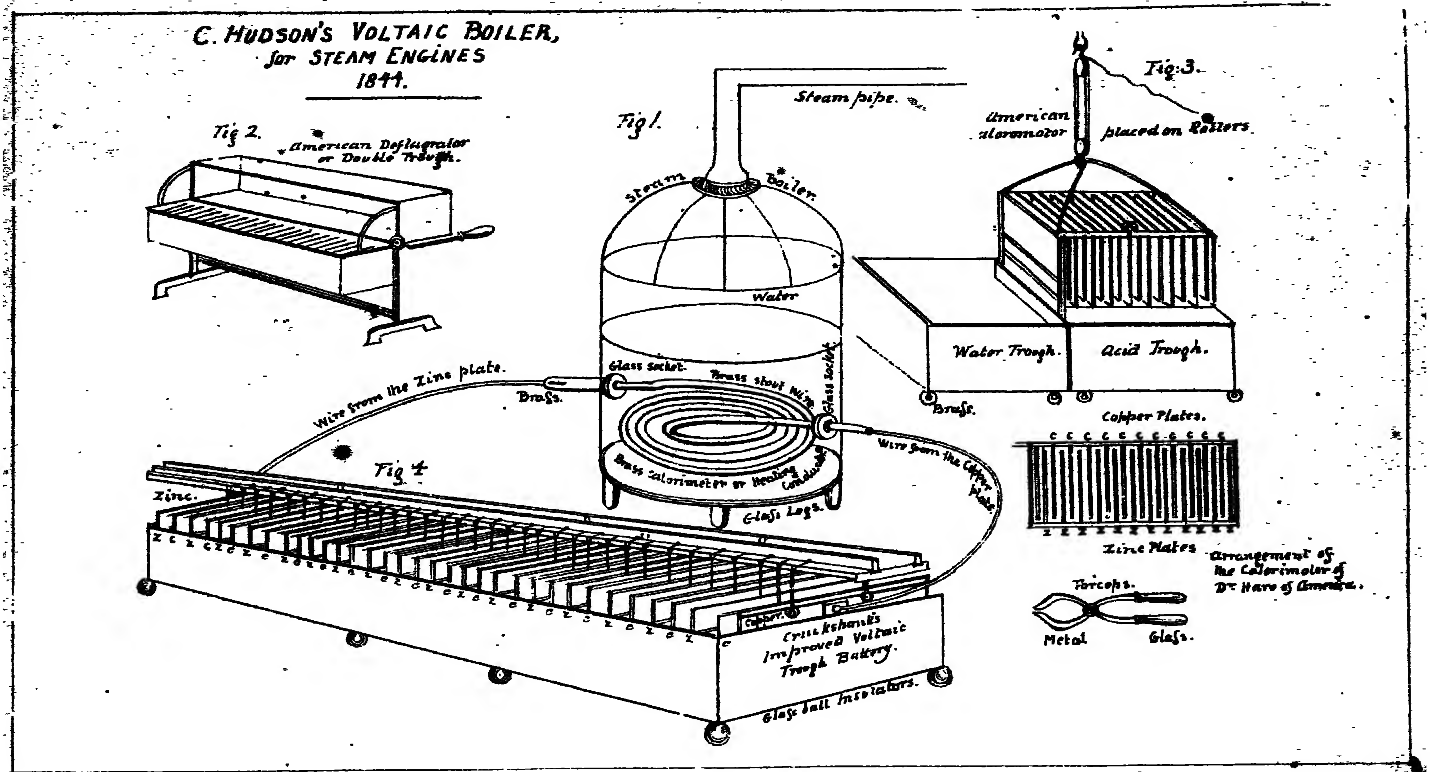
C. HUDSON'S VOLTAIC BOILER,
for STEAM ENGINES
1844.
Fig 2.
American Deflagrator or Double Trough.
Fig 1.
Steam pipe.
Steam
Boiler.
Water
Glass socket.
Brass stout wire.
Glass socket.
Brass.
Brass calorimeter or Heating Conductor
Glass Legs.
Wire from the Zinc plate.
Wire from the Copper plate.
Fig 4
Zinc.
Copper.
Cruickshank's Improved Voltaic Trough Battery.
Glass ball Insulators.
Fig: 3.
American Calorimotor
placed on Rollers
Water Trough.
Acid Trough.
Brass.
Copper Plates.
Zinc Plates
Arrangement of the Calorimotor of Dr. Hare of America.
Forceps.
Metal
Glass.

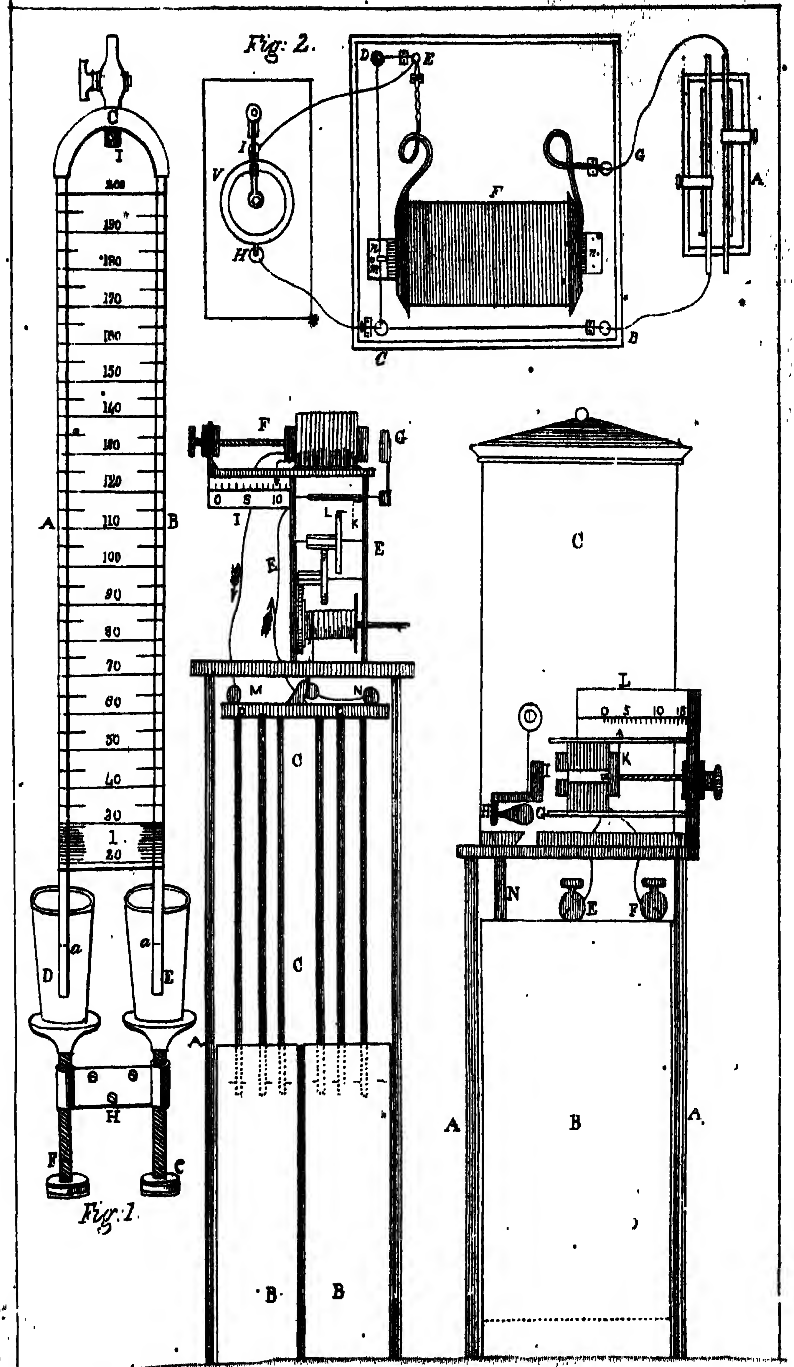
Fig: 2.
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Fig: 1
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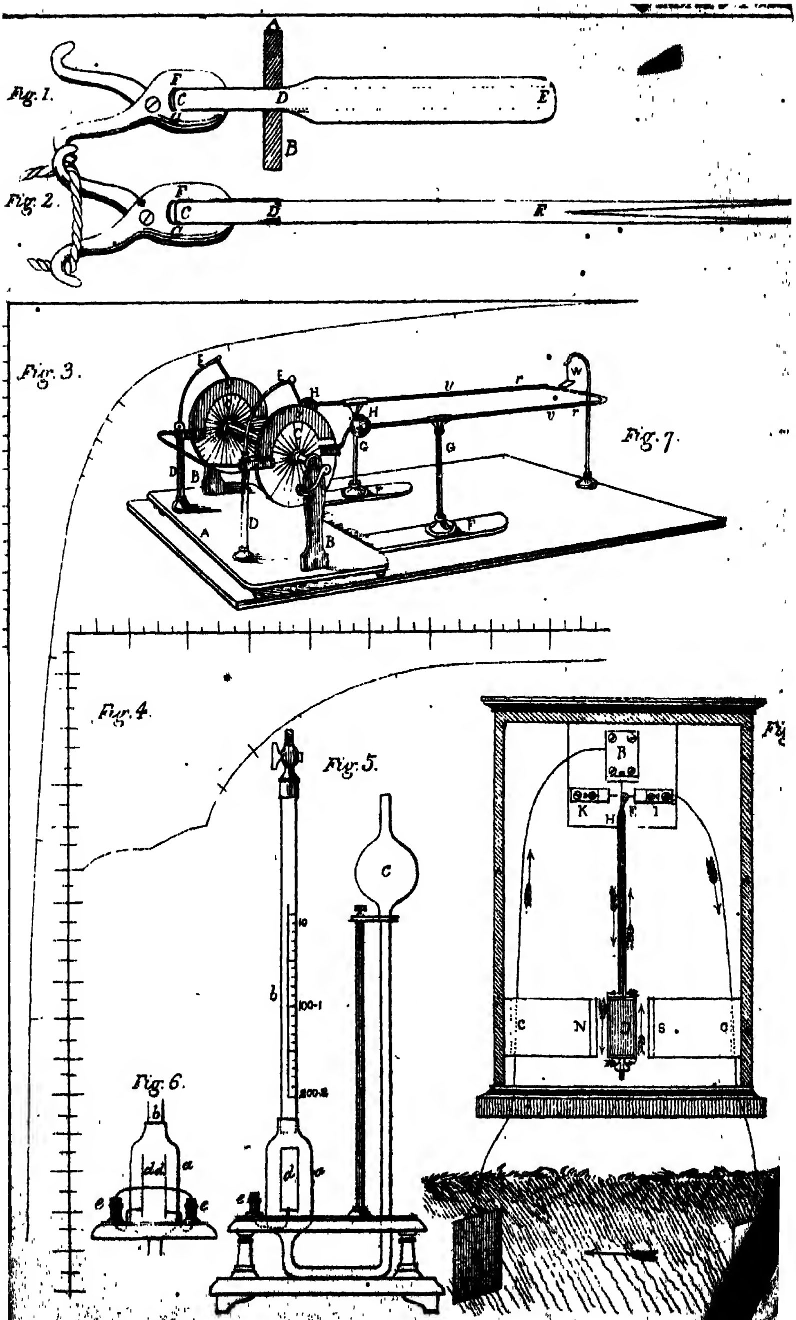
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 7.
Fig. 4.
Fig. 5.
Fig. 6.
10
100-1
200-2